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(54) **ILLUMINATION SYSTEM IN ILLUMINATION DEVICES IN VEHICLES, DEVICE WHICH INCLUDES THE ILLUMINATION SYSTEM AND VEHICLE WITH SAID DEVICE**

(57) The present invention relates to an illumination system which is installed in light signaling devices in vehicles or, generally, to illumination devices in vehicles, including for example the headlights, lamps or similar devices in vehicles, wherein the illumination system comprises a secondary light guide which is installed, coupled to the overlapping configuration of the different primary light guides, with a constant being maintained between

the distances of light input and output of the secondary light guide with the contiguous elements, that is to say, of the entire guide from which light enters and with respect to the light extraction surface of the illumination device. The invention also relates to the device which includes the illumination system as well as to the vehicle which comprises the above illumination device.

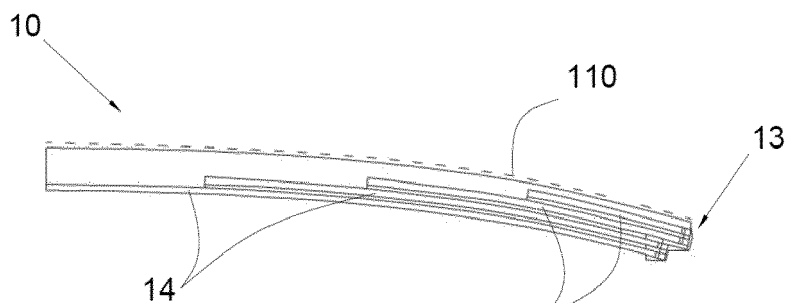


Fig. 2

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Description

[0001] The present invention relates to an illumination system which is installed in light signaling devices in vehicles or, generally, to illumination devices in vehicles, including for example the headlights, lamps or similar devices in vehicles.

[0002] The invention also relates to the device which includes the illumination system as well as to the vehicle which comprises the above illumination device.

Background of the invention

[0003] The illumination systems of illumination devices installed in vehicles known in the prior art usually correspond to headlight or lamp illumination systems as well as to other illumination devices used in vehicles. These illumination systems that are known at present, in addition to their conventional illumination functions for the road and signaling of the vehicle and its maneuvers, currently also perform auxiliary illumination functions, both aesthetic functions and for interacting with the user of the vehicle and/or third persons.

[0004] Similarly, illumination devices are known in the prior art which have various forms, creating geometries which are illuminated owing to the illumination systems contained inside them.

[0005] Both for the new functionalities incorporated in the illumination devices and for the illumination of surfaces with elongated geometry, it is known in the prior art to use a continuous printed circuit board adapted to the new configuration and a higher number of LED elements that cover the entire elongated geometry to be illuminated.

[0006] This solution set out in the case of the above configuration involves a higher cost of the device and, additionally, increased heat generation, leading to an increase in the temperature of the illumination device which requires the effective dissipation of this heat, therefore making the final design of the illumination device more complicated and expensive.

[0007] In the prior art, a solution is proposed for the complexity of the configuration of the illumination system which the device has to incorporate to illuminate the new geometries and perform the new functions, as can be seen in the patent no. FR1650759, which discloses an illumination system based on the emission of light by a limited number of LEDs, which emit light independently to different overlapping sections of a light guide, said light being guided to the optics zone of each section, with the light being directed to the exterior of the illumination system.

[0008] This configuration enables the emulation of an illumination system with numerous LEDs in a large and continuous section of geometry to be illuminated, with a substantially lower number of LED elements.

[0009] This conventional system does not achieve homogeneity in the emission of light in the different points

of the illuminated geometry, resulting in discontinuity in the effect achieved and the continuous effect of the devices with LEDs along the entire geometry not being emulated.

5 **[0010]** Therefore, it is necessary to provide an alternative to the prior art which covers the problems caused in the same, by configuring an illumination system which effectively emulates the lighting dynamics with complete and homogeneous illumination in illumination geometries.
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Description of the invention

[0011] The object of the present invention is to provide an illumination system in illumination devices in vehicles as well as this device, which includes the illumination system, and the vehicle with said device which resolves the cited drawbacks, providing other advantages described below.

15 **[0012]** In accordance with this object, according to a first aspect, the present invention is based on an illumination system in illumination devices in vehicles which comprises two or a plurality of primary light guides partially overlapping in the extraction direction of the light.

20 **[0013]** Each primary light guide comprises at least one end configured to receive light beams generated by at least one light emitting element, with each of the primary light guides comprising at least one light extraction optics zone configured to direct at least part of the light beams transmitted by the respective primary light guide towards the light extraction surface of the device where it is installed.
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[0014] In this configuration, the distance is different, in the extraction direction of the light, between the light output surface of each primary light guide and the light extraction surface of the device where it is installed.
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35 **[0015]** The invention is advantageously based on the fact that the illumination system comprises a secondary light guide arranged between the primary light guides and the light extraction surface of the device where it is installed, this secondary light guide being located at least in the space between the light output surface of each primary light guide and the light extraction surface in the extraction direction of the light.

40 **[0016]** Characteristically, the invention is also based on the fact that the secondary light guide, in this extraction direction of the light, has a depth adapted to the different distances present between the light output surface of each primary light guide and the light extraction surface of the device, maintaining a constant distance between the light output surface of each primary light guide and the corresponding light input surface to the secondary light guide.
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[0017] The invention is also characterized in that the distance between the light output surface of the secondary light guide and the light extraction surface of the device is constant throughout the illumination system.

[0018] In this way, an illumination system is obtained

which prevents the recipient of the light from perceiving losses in intensity resulting from the existence of different light outputs of different guides at different depths, imparting a homogeneous aspect to the illumination system and the illuminated geometry. The above, as disclosed, is achieved owing to:

- the inclusion of a secondary light guide situated between the light output surface of each primary light guide and the light extraction surface in the extraction direction of the light;
- with the distance between light output surface of each primary light guide and the light input surface to the secondary light guide being a constant value; and
- with the distance between the light output surface of the secondary light guide and the light extraction surface of the device also being a constant value throughout the illumination system, and the separation distance between the light output surface of the primary light guide and the light input surface of the secondary light guide can be a different value to the separation distance between the light output surface of the secondary light guide and the light extraction surface of the illumination device.

[0019] This constant distance between the light output surfaces of one primary light guide and the input surface to the secondary guide or between the output surface of the secondary light guide and the light extraction surface of the device, as the case may be, can ensure the correct homogeneity of the light intensity emitted by the illumination device. This correct homogeneity is achieved even though there is this variable distance between the light output surfaces of the primary light guides and the light extraction surface, with said variability of distances being due to the different depth at which the primary light guides are located in the illumination system.

[0020] With respect to this description of main characteristics of the invention, the term "partial overlap" of the primary light guides described should be clarified. It should be taken into account that this overlapping means that at least part of two contiguous primary light guides are located, at least in part, one in front of the other in the extraction direction of the light, providing continuity in the light emission towards the exterior of the primary light guide, effected from the light extraction optics zone.

[0021] Light extraction direction is understood as the main direction in which the light beams are transmitted towards the exterior of the illumination device, this direction normally being perpendicular to the light extraction surface. It is noted that, depending on the illumination geometry which the primary light guides follow, this direction may be the same for the entire illumination device or may be variable, in the case of said primary light guides comprising curved geometries.

[0022] With this configuration, from the recipient's point of view, the perception is a single continuous light

extraction zone, with the secondary light guide being responsible for homogenizing and preventing differences in intensity between different depths of the light extraction optics zones positioned at different depths. This is achieved owing to the fact that there are no losses while the light is transmitted within the secondary light guide. In this way, all the light beams received on the light input surface of the secondary light guide are emitted by the light output surface of said secondary light guide, therefore compensating for the losses that would exist if said secondary light guide were not present in the illumination device.

[0023] In one preferred embodiment of the invention, the primary light guides are not in contact with one another, nor in contact with the secondary light guide. This preferred configuration makes it possible to avoid the undesired transmission of light by contact points or zones between light guides which may direct the light beams in undesired directions. This is resolved in this manner by having a separation between primary light guides and the secondary light guide as well as between the primary light guides themselves, following the requirement of continuous distance. It should be taken into account that said separation between primary light guides and the secondary light guide is produced in the light transmission zones and fastening points or possible contact points may exist between elements of the assembly of the illumination system in zones where there is no light transmission.

[0024] In an optional embodiment of the invention, although in a preferred manner, the primary light guides and the secondary light guide form an assembly obtained using the same production process resulting in a single component.

[0025] This formation in a single component, that is to say, in one piece, makes it possible to form the system using a minimum number of components, reducing the associated assembly operations and providing a more rigid assembly.

[0026] The primary and secondary light guides, although they are preferably produced using a process that creates a single piece or single component as mentioned and therefore have the same physical and optical properties, can alternatively be configured by means of joining them, starting from independent light guides or in independent groups, which makes it possible to introduce secondary light guides with different optical characteristics to the primary light guides and thus to use secondary light guides with less transmissivity in order to favor the final homogeneity.

[0027] In this configuration as a single component of the primary light guides and the secondary light guide, there are one or a plurality of joining points between the primary light guides and the secondary light guide, located in the zone of the light input end to the primary light guide.

[0028] This single-component configuration, implemented for example using an injection method, requires

there to be contact points or zones between the different guides for the communication of the flow of the injection component, with these contacts between primary and/or secondary light guides being adapted to prevent the undesired transmission of light through them. Thus, to obtain said single component, flow communication zones are required between the different light guides. These joining zones would be located in zones where there is no light transmission, that is to say, zones different to the output surfaces of the primary light guides and the output surface of the secondary light guide, such as a zone adjacent to the light input end to the primary light guide.

[0029] Preferably, the light extraction optics zones of the primary light guides are aligned, following the direction of the geometry of the illumination device, forming a visually continuous section of extraction optics zones from the perspective of the light extraction surface in a direction substantially identical to the extraction direction of the light.

[0030] This preferred embodiment makes it possible to provide extraction optics zones, which, in addition to being in contiguous overlapping primary light guides, the shape followed by all the light extraction optics zones together follows the illumination geometry desired for the device. Thus, even proceeding from light extraction optics zones which are located in independent primary light guides, being in a stepped arrangement with one another, an external observer sees a continuously illuminated surface from end to end. The introduction of the secondary light guide overlapping with said light extraction optics zones will make it possible for said external observer to also see a homogeneously illuminated continuous surface.

[0031] Preferably, the light extraction optics zone of the primary light guides is located facing the light output surface of each primary light guide.

[0032] This preferred configuration is located in planes substantially parallel to the surface containing the light extraction optics zone, with respect to the plane forming the light output surface, with these planes in turn preferably being orthogonal with respect to the extraction direction of the light.

[0033] Analogously to the previous embodiment and also preferably, the light output surface of each primary light guide is located facing the light input surface of each secondary light guide.

[0034] This above configuration is likewise located in planes substantially parallel to the light output surface of each primary light guide, with respect to the plane forming the light input surface of the secondary light guide, with these planes in turn preferably being orthogonal with respect to the extraction direction of the light.

[0035] In one optional embodiment of the invention, the at least one transition zone between two contiguous light input surfaces of the secondary light guide, corresponding to the zone of varying depth of the secondary light guide, comprises optics, directional marks or engravings of the light.

[0036] This transition zone incorporates these directional elements of the light and/or of its diffusion so that, from the recipient's point of view, this zone is not identified as a discontinuity between the light extraction optics zones. The optical structures located in said transition zones between sections of the secondary light guide at different depth will make it possible to direct the light beams transmitted through the interior of the same so that they compensate for the discontinuity between contiguous extraction optics zones.

[0037] In another of the possible embodiments of the invention, the light extraction optics zone of the primary light guides is overlapped, at least in part, with at least the light extraction optics zone of a contiguous primary light guide, from the perspective of the light extraction surface.

[0038] This overlap of the light extraction optics zones between two contiguous primary light guides makes it possible to ensure that a discontinuity cannot be seen in the light extraction optics zones when this light extraction optics zone, in a primary light guide further inside the system, has an extension of said zone partially behind the primary light guide in front of it.

[0039] According to another of the possible embodiments and taking into account the last two embodiments described, the illumination system comprises a combination of optical structures located in said transition zones and also comprises an overlap of light extraction optics zones between two contiguous primary light guides.

[0040] In another possible embodiment of the invention, the light extraction optics zones of the primary light guides are different to one another, the extraction optics zones furthest from the light emitting element having deeper optics.

[0041] This makes it possible to provide optics in a primary light guide with different characteristics with respect to the optics of any of the other primary light guides forming the illumination system. It should be taken into account that within the same light extraction optics zone, there may also be differences in the type of optics without being homogeneous within the same zone of the same primary light guide. Thus, the increase in distance between the light emitter and the optical structures arranged in the extraction optics zones can be compensated. This also means that the beams emitted by the different primary light guides are homogeneous throughout the illumination device.

[0042] According to a preferred embodiment of the invention, the illumination system has one or a plurality of control elements for the functioning of the light emitting elements independently of at least one light emitting element.

[0043] These control elements make it possible to control the light emitting elements acting in each primary light guide in order to actuate them in such manner that the desired effect is achieved, whether statically or dynamically. The control elements are based on a printed control

board or a similar system enabling the coordinated functioning of all light emitting elements to be managed and programmed, taking into account the primary light guide to which they supply light. In this way, when the light emitters are turned on or off simultaneously, a visual turned-on or turned-off effect of an elongated illuminated surface is generated. Contrarily, when the light emitters are turned on or off in sequence, a visual filling or emptying effect of an elongated illuminated surface is generated, in accordance with the number of primary light guides present.

[0044] In accordance with the objects of the invention, according to a second aspect, the present invention is based on an illumination device in vehicles, which comprises an illumination system and a light extraction surface of the device, with the device comprising one or a plurality of illumination systems, as described in the characteristics above in the first aspect of the invention.

[0045] This makes it possible to have an illumination device which, owing to the configuration of the illumination system indicated, has a smaller number of LEDs associated with it, with optimal homogeneity and continuity in the light emitted.

[0046] Also in accordance with the objects of the invention, according to a third aspect, the present invention is based on a vehicle, which comprises one or a plurality of illumination devices and advantageously incorporates at least one illumination device, which has the characteristics described above in the second aspect of the invention.

[0047] In light of this, the invention makes it possible to provide a vehicle having the indicated advantages for the illumination device and system indicated above.

Brief description of the figures

[0048] In order to better understand what has been set forth, several drawings are attached wherein a practical embodiment is schematically depicted merely by way of non-limiting example.

Figure 1 is a rear elevation view of a vehicle with a rear illumination device.

Figure 2 is a plan view of an illumination system like the one incorporated in the illumination device of the vehicle shown in Figure 1.

Figure 3 is a partial perspective view of the illumination system in its light emitter installation zone and the start of each primary light guide.

Figure 4 is a partial detailed plan view of the illumination system shown in Figure 2.

Description of a preferred embodiment

[0049] Various embodiments of the invention are described below in a non-limiting manner to provide a better understanding of the indicated characteristics.

[0050] According to a preferred embodiment of the in-

vention and as can be seen from Figure 1, the invention is configured as an illumination system (10) integrated into an illumination device (100) which is mounted in a vehicle (200) for signaling maneuvers, position, etc.

[0051] In the present case, the vehicle (200) has an illumination device (100) formed by the side lamps (101) with intermittent lights, reverse, position and brake as well as a central elongated illumination geometry (102) which can be used as a third brake light, position light and/or as dynamic illumination routines when opening the vehicle, for example. In the present embodiment, the illumination system (10) object of the invention is incorporated in this central elongated illumination geometry (102).

[0052] Thus, an observer located at the rear part of the vehicle (200) views an elongated and narrow illuminated surface which extends from the right-hand side lamp (101) to the left-hand side lamp (101).

[0053] The illumination system (10), as can be seen in Figures 2 to 4, is formed by a multiplicity of light emitting elements (11), in this case LEDs, located on a board (12) and their power supply and functioning is controlled by a control element, not shown in the figures, located on the same board (12).

[0054] Each one of these light emitters (11) generates light beams directed towards a light input end (13) of a determined primary light guide (14) such that if the light emitted by each one of these light emitting elements (11) is controlled, the emission of light through the associated primary light guide (14) is controlled. In the present embodiment, each light emitter (11) is associated with a single primary light guide (14). To this end, each primary light guide (14) has optical elements to receive the light beams emitted by the associated light emitter (11) and to transmit them through said primary light guide (14).

[0055] The primary light guides (14) are formed, in the present case, by pieces of polymeric material which make it possible to pass and conduct light through said light guides (14) with a high transmissivity, that is to say, without significant losses in light intensity from the input point to the output point of the same.

[0056] The illumination system (10) is based on the fact that each one of the primary light guides (14), which conducts the light generated by a determined light emitting element (11), is located overlapped on part of the length of the primary light guide (14) behind it. This overlap is implemented in the extraction direction (e) of the light beams of the illumination system (10), a stepwise arrangement of primary light guides (14) in a substantially horizontal plane being formed in the present embodiment.

[0057] Each one of the primary light guides (14) has a light extraction optics zone (15) in its interior, in the section where there is no other primary light guide (14) overlapping in front. This light extraction optics zone (15) is formed by optical elements which direct the light conducted by the primary light guide (14) towards the light extraction surface (110) of the illumination device (100).

[0058] This configuration means that the light output surface (16) of each one of the primary light guides (14) is located at a different distance (d) with respect to the light extraction surface (110) in accordance with its depth position in the stepwise arrangement forming the assembly of primary light guides (14).

[0059] In order to prevent this difference in depth of the light output surface (16) of each one of the primary light guides (14) possibly causing a difference in intensity of the light seen by the user when it is extracted by the light extraction surface (110), the system incorporates a secondary light guide (17) which is located in the space between the light output surface (16) of each one of the primary light guides (14) and the light extraction surface (110) of the device (100) in the extraction direction of the light, being adapted to the stepwise shape of the configuration of the light output surfaces (16) of each primary light guide.

[0060] An essential characteristic is this adaptation of the secondary light guide (17) to the light output surface (16) of each one of the primary light guides (14) and to the light extraction surface (110), which is implemented whilst maintaining a constant distance between the light output surface (16) of each primary light guide (14) and the corresponding light input surface (18) to the secondary light guide (17). At the same time, the distance between the light output surface (19) of the secondary light guide (17) and the light extraction surface (110) of the illumination device (100) is maintained constant over the entire geometry (102) where the illumination system (10) is installed.

[0061] Consequently, the secondary light guide (17) comprises a plurality of sections with different depth following the extraction direction of the light. The depth of each section is adapted to the variable distance (d) between each one of the light output surfaces (16) of the respective primary light guide (14) and the light extraction surface (110).

[0062] In addition to the constant configuration of distances between surfaces detailed above, the plane containing the light extraction optics zone (15) of each primary light guide (14) is located facing the plane forming the light output surface (16) of each primary light guide (14). The light output surface (16) of each primary light guide (14) is in turn located facing the light input surface (18) of the secondary light guide (17). All these opposing arrangements of output and input surfaces in the light guides (14, 17) make it possible to have a predominant light extraction in the desired direction.

[0063] Since these light extraction optics zones (15) do not have any overlap of primary light guides in the direction (e) in which they extract the light and the trajectories of the geometry of the light extraction optics zones (15) themselves are aligned, following the geometry (102) of the illumination device (100), it means that, from an external observer's point of view, the illumination system (10) generates the effect of having a continuous light extraction optics zone (15) along the entire geometry

(102) of the illumination system (10).

[0064] The light extraction optics zones (15) of the primary light guides (14) are overlapped on a small section with at least the light extraction optics zone (15) of a front and/or rear contiguous primary light guide (14), from the perspective of the light extraction surface (110), to ensure that there is no angle at which a discontinuity can be observed in the emission of light by the illumination system (10).

[0065] With respect to this, alternatively or complementarily to what has been described above regarding the partial overlap of the light extraction optics zones (15), the transition zone between two contiguous light input surfaces (18) of the secondary light guide (17), corresponding to the zone of varying depth of the secondary light guide (17), comprises optics, directional marks or engravings of the light to ensure correct diffusion of the light in this zone and so that it does not exhibit any discontinuity in these transition points or zones.

[0066] With the aim of achieving increased homogeneity in the light beams extracted in each primary light guide (14) of the present preferred embodiment, the light extraction optics zones (15) have optics with a variation in at least one of their geometric parameters, such as different depth of the optics, a different separation distance between consecutive optics, etc. In this way, it is possible to minimize the changes in intensity that may occur in different primary light guides (14).

[0067] In this respect, it should be taken into account that each primary light guide (14) has its respective light extraction optics zone (15) at a different distance from the associated light emitter (11). Additionally, in a light extraction optics zone (15), when the distance with respect to the associated light emitter (11) is increased, the number of remaining light beams transmitted in the interior of the primary light guide (14) itself is reduced, since it was part of those extracted by the respective light extraction optics (15). Both aspects are compensated with this determined design of the parameters defining the optics.

[0068] In the present embodiment, the assembly of primary light guides (14) and the secondary light guide (17) are produced using the same production process, forming a single component, a single piece, normally using injection processes with the same polymeric material which allows for the transmissivity conditions of the light, as mentioned, which are required for the correct functioning of the invention, taking into account that the light guides are normally used for this purpose of guiding light in the prior art.

[0069] This method of forming the assembly of primary light guides (14) and the secondary light guide (17) means that both light guides (14, 17) have the same optical characteristics.

[0070] In addition to the above, even though the primary light guides (14) are separated from one another, without contact points or surfaces which could mean undesired diffusion points of the light, the process of forming

the single component necessarily means having communication points between the different guides (14, 17) in order to allow the flow of material in the injection process. In this case, these joining points are located at the end (13) of the input zone of the light beams to the primary light guide (14), said communication points being treated so that the guided light does not pass through them and they cannot disperse the light emission.

[0071] In alternative embodiments of the invention, there may be an assembly of primary light guides (14) and the secondary light guide (17) formed by independent elements which are assembled to form the illumination system (10), secondary light guides (17) with optical properties different to the primary light guides (14) can be assembled, if necessary.

[0072] According to the embodiment presented in the Figures 2 to 4, four primary light guides (14) are exhibited. The primary light guide (14) arranged closest to the light extraction surface (110) comprises a shorter length. Contrarily, the primary light guide (14) arranged furthest from the light extraction surface (110) comprises a longer length. The two intermediate primary light guides (14) comprise an intermediate length between both. The length of each one of the primary guides (14) progressively increases from the primary light guide (14) closest to the light extraction surface (110) to the one furthest from the light extraction surface (110).

[0073] According to the embodiment presented, the primary light guide (14) of longer length is equal to half the length of the hatch or rear door of the trunk of the vehicle (200) shown in Figure 1. Thus, to cover the entire space present between the left-hand side lamp (101) to the right-hand side lamp (101), there must be two illumination systems (10) arranged in symmetry, according to a vertical plane. The light emitters (11) and the respective control element (12) are arranged in the zones close to both left-hand and right-hand side lamps (101), respectively.

[0074] Despite having referred to a specific embodiment of the invention, it is evident for one skilled in the art that the illumination system in illumination devices in vehicles as well as this device, which includes the illumination system, and the vehicle having said device described above are susceptible to a number of variations and modifications, and that all the mentioned details can be replaced with other technically equivalent ones without departing from the scope of protection defined by the attached the claims.

Claims

1. An illumination system in illumination devices in vehicles, which comprises two or more of primary light guides (14) partially overlapping in an extraction direction of the light; wherein each primary light guide (14) comprises at least one end (13) configured to receive light beams generated by at least one light

emitting element (11); wherein each one of the primary light guides (14) comprises at least one light extraction optics zone (15) configured to direct at least part of the light beams transmitted by the respective primary light guide (14) towards a light extraction surface (110) of the illumination device (100) where it is installed; and wherein a distance (d) is different, in the extraction direction of the light, between a light output surface (16) of each primary light guide (14) and the light extraction surface (110) of the illumination device (100) where it is installed;

characterized in that the illumination system (10) comprises a secondary light guide (17) arranged between the primary light guides (14) and the light extraction surface (110) of the illumination device (100) where it is installed, this secondary light guide (17) being located at least in a space between the light output surface (16) of each primary light guide (14) and the light extraction surface (110) in the extraction direction of the light;

wherein the secondary light guide (17), in this extraction direction of the light, has a depth adapted to the different distances (d) present between the light output surface (16) of each primary light guide (14) and the light extraction surface (110) of the illumination device (100), with a constant distance being maintained between the light output surface (16) of each primary light guide (14) and a corresponding light input surface (18) to the secondary light guide (17); and wherein distance between a light output surface (19) of the secondary light guide (17) and the light extraction surface (110) of the device (100) is constant throughout the illumination system (10).

2. The illumination system according to claim 1, wherein the primary light guides (14) are not in contact with one another, nor in contact with the secondary light guide (17).

3. The illumination system according to any of the preceding claims, wherein the primary light guides (14) and the secondary light guide (17) form an assembly obtained using the same production process resulting in a single component.

4. The illumination system according to claim 3, wherein the single component formed by the primary light guides (14) and the secondary light guide (17) has one or more of joining points between the primary light guides (14) and the secondary light guide (17), located in the zone of the light input end (13) to the primary light guide (14).

5. The illumination system according to claim 1, where-

in the light extraction optics zones (15) of the primary light guides (14) are aligned, following the direction of geometry (102) of the illumination device (100), forming a visually continuous section of extraction optics zones (15) from the perspective of the light extraction surface (110) in a direction substantially identical to the extraction direction of the light.

- 5
6. The illumination system according to claim 1 or 5, wherein the light extraction optics zone (15) of the primary light guides (14) are located facing the light output surface (16) of each primary light guide (14). 10
7. The illumination system according to any of the preceding claims, wherein the light output surface (16) of each primary light guide (14) is located facing the light input surface (18) of the secondary light guide (17). 15
8. The illumination system according to any of the preceding claims, wherein at least one transition zone between two contiguous light input surfaces (18) of the secondary light guide (17), corresponding to a zone of varying depth of the secondary light guide (17), comprises optics, directional marks or engravings of the light. 20 25
9. The illumination system according to claim 1, 5 or 6, wherein the light extraction optics zone (15) of the primary light guides (14) is overlapped, at least in part, with at least the light extraction optics zone (15) of a contiguous primary light guide (14), from the perspective of the light extraction surface (110). 30
10. The illumination system according to claim 1 or 9, wherein the light extraction optics zones (15) of the primary light guides (14) are different to one another, the extraction optics zones (15) furthest from the light emitting element (11) having deeper optics. 35 40
11. The illumination system according to claim 1, wherein the illumination system has one or a plurality of control elements for the functioning of the light emitting elements (11) independently of at least one light emitting element (11). 45
12. An illumination device in vehicles which comprises an illumination system (10) and a light extraction surface (110) of the illumination device (100), **characterized in that** the illumination device (100) comprises one or a plurality of illumination systems (10), like the one whose characteristics are described in any of claims 1 to 11. 50
13. A vehicle, which comprises one or a plurality of illumination devices, **characterized in that** at least one of the illumination devices (100) incorporated therein has the characteristics of claim 12. 55

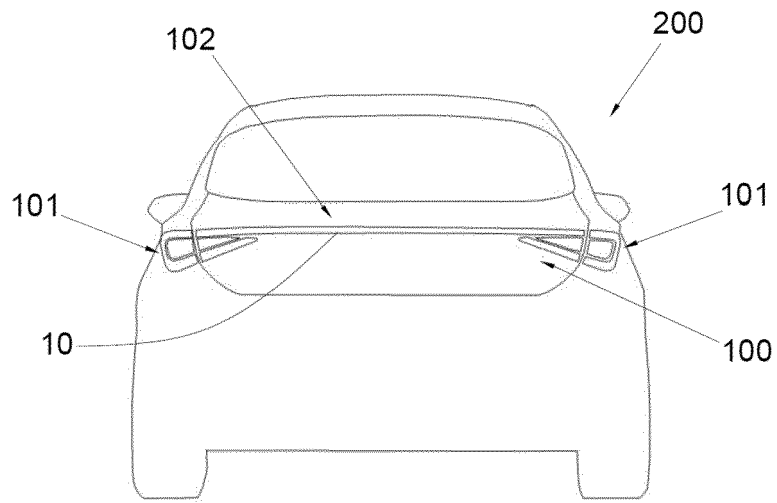


Fig. 1

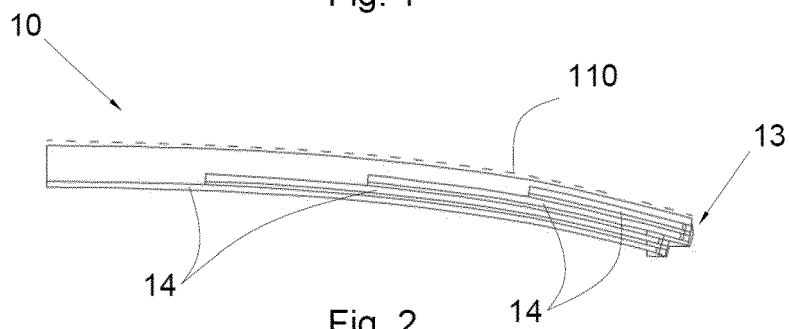


Fig. 2

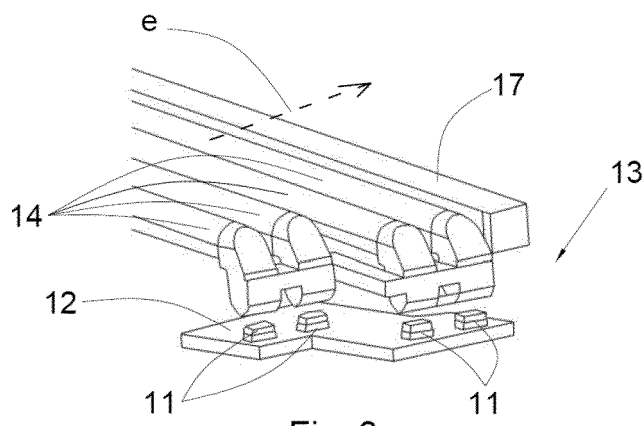
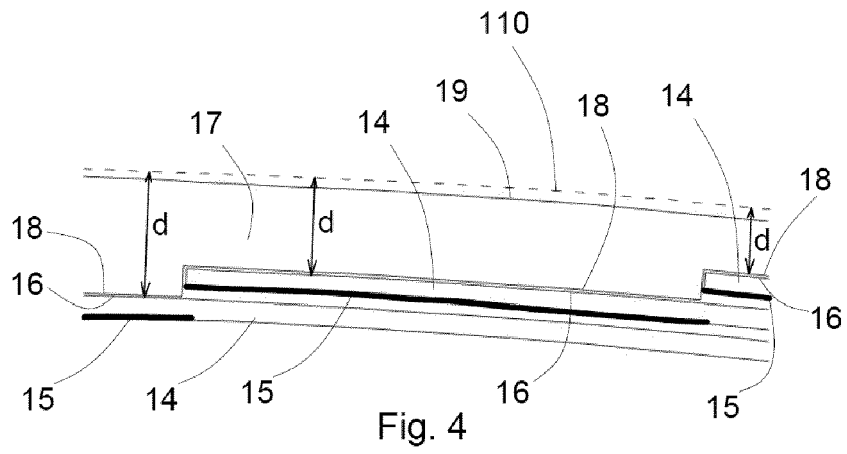


Fig. 3





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Place of search Munich		Date of completion of the search 24 March 2022	Examiner Billen, Karl
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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