(19) DANMARK

(10) DK/EP 3081855 T3

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: ***F 21 V 14/02 (2006.01)*** *F 21 W 131/107 (2006.01)* *F 21 Y 115/10 (2016.01)* ***F 21 V 14/06 (2006.01)*** *F 21 Y 103/10 (2016.01)* ***F 21 V 21/30 (2006.01)*** *F 21 Y 113/00 (2016.01)*

(45) Oversættelsen bekendtgjort den: **2019-06-11**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2019-03-20**

(86) Europæisk ansøgning nr.: **16162060.4**

(86) Europæisk indleveringsdag: **2016-03-23**

(87) Den europæiske ansøgnings publiceringsdag: **2016-10-19**

(30) Prioritet: **2015-04-13 DE 102015105592**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **JB-Lighting Lichtanlagentechnik GmbH, Sallersteigweg 15, 89134 Blaustein, Tyskland**

(72) Opfinder: **HOFFMANN, Helge, Adalbert-Stifter-Strasse 18, 89269 Vöhringen, Tyskland**
TOBUSCHAT, Hans-Ulrich, Kornblumenweg 1, 89134 Blaustein, Tyskland

(74) Fuldmægtig i Danmark: **RWS Group, Europa House, Chiltern Park, Chiltern Hill, Chalfont St Peter, Bucks SL9 9FG, Storbritannien**

(54) Benævnelse: **PROJEKTØR**

(56) Fremdragne publikationer:
EP-A1- 1 821 030
DE-A1-102008 021 538
DE-U1-202012 103 660
FR-A1- 2 981 432
FR-A1- 2 988 464
US-A1- 2008 002 413
US-A1- 2010 296 285

Description

The invention relates to a spotlight for illuminating an object, in particular a building façade or a stage area, such as a stage wall, a curtain or the like.

From the general state of the art, spotlights are known which are used in particular for the coloured illumination of building façades. Often, spotlights are used which are placed at a predetermined distance from the building façade and can irradiate the façade with sufficiently high light intensity. In particular, for the purpose of generating optical effects the spotlight can be designed to be pivotable, so that, for example, the light radiated by it, which typically strikes the façade in a light cone, can be moved across the façade and thus directed at different areas. It is also possible to change the radiation properties of the spotlight, so that, for example, different colours or colour gradients can be generated.

Extensions of such spotlights are embodied in the form of elongated multiple-light arrangements that contain a plurality of light sources, wherein multiple arrangements pivotable also along the longitudinal axis have already been proposed.

Such spotlights are often used in architectural lighting schemes to achieve optical effects, which has proven effective especially at entertainment events. In order also to use such spotlights for illuminating building façades outdoors, it is also possible to design them to be at least protected from spray-water.

In another application, effect spotlights are used, for example, to illuminate the background of a stage. Here, too, a spotlight is again placed at a distance from a back wall of the stage, often with a foil or a textile fabric being provided as the back wall, which is illuminated by the spotlight. In order to achieve colour effects, again the spotlight can be designed to be programmable with regard to its colour emission properties and

also directed to different areas of the stage. Such spotlights have been used successfully in particular in theatrical or music events in concert halls.

A problem that occurs with known spotlights is that when the direction of radiation of the light cone emitted by the spotlight is changed, the light emitted by it strikes the area to be illuminated at different angles. A spotlight which is arranged at a fixed distance to the surface to be illuminated will therefore illuminate different-sized areas of the building or the stage area when there is a change in the radiation direction. This changes the intensity of the illuminated area.

In order to solve this problem, the spotlights known from the prior art are usually equipped with interchangeable optical modules which are mounted, for example, on a base plate and cover the light-emitting elements. In this way, the radiation characteristic of the spotlight can certainly be changed. But this is a very time-consuming process, so that the change in the intensity of the illuminated area is often not corrected and is maintained during an illumination of the building or stage area.

Document DE 20 2012 103 660 U1shows a spotlight, which can be used, in particular, as a light source in object monitoring. The spotlight comprises a closed housing, which encloses lamps mounted on circuit boards. In the radiation direction a convergent lens is mounted after each lamp, which is followed by a divergent lens. The lens arrangement can be a circular arrangement of three lenses of different focal length, which when rotated allows a desired lens to be moved into the beam path of the convergent lens.

The document FR 2 981 432 shows an elongated lamp arrangement, which can be used, in particular, for mood lighting in theatres or concert halls. The lamp arrangement consists of individual lamps chained together, to each of which a lens is assigned. The lenses allow the light generated by the lamps to be focussed, by the lenses being movable in the light emission direction.

From EP 1 821 030 A1a light-emitting diode arrangement is known, which is intended in particular for underwater use. To protect against the ingress of water, the LEDs arranged on a circuit board are covered in the beam direction by a plastic plate and in the opposite direction by a cover plate with cooling fins. This LED arrangement can be inserted into a plinth in conjunction with a lens array.

The US 2008/0002413 A1shows a spotlight, which consists of an arrangement of a plurality of individual light sources. The light sources are fitted with a reflector placed in the beam direction, which enables focussing. In addition, the light source and reflector are pivotably mounted about an axis parallel to the beam direction and about an axis parallel to the beam direction. The entire arrangement is in turn pivotably mounted in relation to its installation surface.

In DE 10 2008 021 538 A1 a spotlight assembly is disclosed, consisting of a plurality of cardan mounted light sources with a reflector shield. Each of the light sources is mounted on a spherical-segment shaped saddle, which fits with a positive fit into a through hole in the carrier rail.

Document US 2010/296285 A1 discloses a spotlight based on LED modules, which has a plurality of LED modules arranged in the form of a beam, which are pivotably mounted. Each LED module can be adjusted in its intensity and focus.

Document FR 2 988 464 A1 shows an illumination device with a frame for fastening the device to a carrier and with a linear projector which is fitted with light sources, each of which emits a light beam, the projector being fastened to the frame and being pivotable relative to the frame about the longitudinal axis of the projector, wherein the device has control means for adjusting the brightness of each of the light sources and also for adjusting the position of the projector relative to the frame, wherein the device is fitted with means for adjusting the

emergence angle of the light beams from each of the light sources.

The object of the invention therefore is to specify a spotlight for illuminating an object, such as a building façade or a stage area, which has an improved radiation characteristic, in particular to create homogeneous intensity distributions on the surface of the object to be illuminated even when a change occurs in the light radiation direction.

This object is achieved by the features of Claim 1. Further advantageous configurations of the invention are the subject matter of the dependent claims. These can be combined with each other in technologically meaningful ways. The description, in particular in conjunction with the drawing, additionally characterizes and specifies the invention.

According to the invention a spotlight is created for illuminating an object, in particular a building façade or a stage area, comprising a housing and a light source that generates electromagnetic radiation in a range perceptible to a human eye, wherein the light source has a multiplicity of luminous bodies arranged in a plurality of groups, wherein each of the groups of luminous bodies is pivotable individually relative to the housing, such that each of the groups of luminous bodies is able to illuminate the object in an illumination field allocated to the respective group of luminous bodies, wherein the groups of luminous bodies in each case have an adjustable focusing, such that identical dimensions and/or illumination intensities are adjustable on the object to be illuminated in the case of different illumination fields.

As a result, a spotlight is created, in which electromagnetic radiation in the form of visible light is emitted by a plurality of luminous bodies. The luminous bodies are arranged in groups and the groups are individually pivotable relative to the housing. Therefore, the housing can be aligned on a stand with regard to the object to be illuminated, to cover a desired illumination surface. Furthermore, each of the groups of

luminous bodies now irradiates different illumination fields on the object to be illuminated. In order to prevent different illumination fields with different intensities or in different dimensions from arising on the object to be illuminated, the emission characteristic of each group of luminous bodies can be adjusted with regard to its focussing. This means that both the dimensions of the illumination fields, as well as via the control of the luminous bodies themselves, the illumination intensity within the illumination fields can be adjusted so that a homogeneous overall impression is produced over the object to be illuminated. Due to this approach, the enlargement of illumination fields located further away, as observed in spotlights designed in accordance with the prior art, is avoided. This enlargement, which can also be associated with a decreased irradiance, is also perceived as disturbing even when a spotlight according to the prior art is not changed with respect to its radiation angle onto the object to be irradiated, since an inhomogeneous exposure intensity exists within the illuminated area. In accordance with the invention, this is prevented by the illumination intensities and size of the exposure fields being adjustable for each of the groups of luminous bodies, so that the entire area to be illuminated is as homogeneous as possible. Therefore, it is possible to create a uniform visual impression over a large area of the object to be illuminated. The spotlight according to the invention is therefore particularly suitable for illuminating fixed objects, such as parts of stages or of building façades. The individual luminous bodies can emit different colours, wherein it is also possible to create different colour impressions, both within a group of luminous bodies as well as between adjacent groups of luminous bodies. In this case it is also possible to create a continuous colour gradient, which is not disturbed in its visual impression by enlarged exposure fields. Such an approach is advantageous both in static operation, i.e. with the alignment of the groups of luminous bodies onto different exposure fields, as well as in dynamic operation, i.e. under time-dependent pivoting of the individual groups of luminous bodies.

In accordance with the invention each of the group of luminous bodies is provided with a rotation spindle for pivotability, which engages into a mount preferably implemented as a frame in the interior of the housing.

In order to create a simple but reliable pivotability of the group of luminous bodies, this group is provided with a rotation spindle, which engages into the mount which encloses the group of luminous bodies. The mount is advantageously designed as a frame that surrounds the group of luminous bodies. It is also possible, however, to use a support in the form of a U-profile or the like. The rotation spindle can be arranged substantially horizontally when the spotlight is used as intended, wherein within the scope of the invention it is also possible to design the rotation spindle to be inclined with respect to, for instance, a horizontal surface. According to a further embodiment of the invention, two rotation spindles are provided, which are rotatably mounted in the mount on opposite sides of the group of luminous bodies.

A particularly simple pivoting facility is achieved in which two rotation spindles are present, which on opposite sides engage in the mount which is designed, for example, as a frame. This simplifies the alignment of the individual groups of luminous bodies to each other and reduces mechanical stresses during the pivoting of the individual groups of luminous bodies of the spotlight.

According to a further embodiment of the invention, each group of luminous bodies has an elongated base body on which the luminous bodies are arranged. In doing so, the elongated base bodies of the groups of luminous bodies can be arranged parallel to each other along their longitudinal axes.

Accordingly, the light source is preferably embodied as a multiple arrangement of luminous bodies, which assigns a strip-shaped part of the light source to each group of luminous bodies. This creates a two-dimensional arrangement of luminous bodies

in which adjacent rows form adjacent groups of luminous bodies. The luminous bodies can be arranged side by side within a row. Such a spotlight therefore combines the beam-shaped spotlights known in the state of the art to form a compact unit.

According to the invention, each luminous body is provided with a lens suitable for focusing the emitted electromagnetic radiation, wherein the lenses for each group of luminous bodies are arranged on a carrier plate.

In order to focus the emitted electromagnetic radiation, a lens is assigned to each luminous body, wherein for calibration purposes, each lens can also be individually adjustable on the carrier plate within a group of luminous bodies. The mounting of the lenses on the carrier plate simplifies the design of the spotlight, and in particular the adjustment of the lenses with respect to the luminous bodies, which only needs to be carried out for each group of luminous bodies with respect to the carrier plate. The carrier plate can be connected to the above-mentioned elongated base body, whereby the focus setting is maintained during the pivoting of the group of luminous bodies.

According to a further embodiment of the invention, the carrier plate is adjustable, so that the focussing for each of the groups of luminous bodies can be adjusted via the adjustable carrier plate.

In addition to an individual adjustability, in particular in the context of the invention, provision is made to focus each of the groups of luminous bodies individually, in which the lenses are moved together. As a result, the size of an illumination field can be defined individually for each of the groups of luminous bodies, wherein the common adjustability of the lenses can also be designed in such a way that the variation of the focus can follow the instantaneous degree of pivot. Thus, not only can equal dimensions or illumination intensities within the different illuminating fields be implemented statically, but it is also possible to fix these dynamically when changing the

rotational axes, which leads to improved impressions for the viewer especially in the case of movable object illuminations. The carrier plate can advantageously be connected to the above-mentioned elongated body such that the focus setting of the group of luminous bodies is adjusted by varying the distance between the carrier plate and the elongated body. The variation of the distance can be carried out either manually or preferably using a motorised control.

According to a further embodiment of the invention the luminous bodies are implemented at least partially as light emitting diodes.

Due to their low power loss combined with high intensity of the emitted light, light-emitting diodes are preferably used. Both single light-emitting diodes as well as a plurality of light emitting diodes, or multi-LEDs, can be used. These can also be provided with different colours within one luminous body. In this way, for example, by installing three light emitting diodes, or using multi-LEDs, almost any desired colours can be generated for each luminous body. It is particularly preferable to implement the spotlight completely with light-emitting diodes, wherein in the context of the invention it is also possible to apply a different technology in individual luminous bodies.

According to a further embodiment of the invention, the housing encloses the mount, wherein the mount is rotatably connected to an installation element.

In order to set a basic orientation, the spotlight is designed to be rotatable with respect to the mount, wherein the mount together with the housing can be moved relative to the installation element. The installation element can preferably be designed in the form of a bracket which is provided with a mounting surface, which allows a stable installation of the spotlight.

According to a further embodiment of the invention the housing

is embodied in a multipart fashion, in particular in a bipartite fashion, wherein the parts of the housing are exchangeable.

Accordingly, either one or all parts of the housing can be matched, for example, to the colour of their respective environments with regard to their visual appearance, by replacing them by a differently designed variant. This is important in trade fair events, for example, because the lights used are often in the field of view of the visitors and should be of lesser importance than the stand design. By replacing individual or all parts of the housing this can be carried out in a simple manner. The ability to be able to exchange parts of the housing, however, requires some constructional measures, such as the attachment of the luminous bodies to the mount and connecting the mount to the installation element, so that no extensive work needs to be done on the housing, in order to be able to exchange its parts.

According to a further embodiment of the invention, the housing has a window on its front side, through which window the electromagnetic radiation is able to penetrate.

A transparent window provides protection against environmental influences such as dust or water, and also prevents contact with the luminous bodies, which can advantageously have a positive impact on the service life of the spotlight.

According to a further embodiment of the invention the housing is embodied with an opening for feeding cooling air that can be directed onto heat sinks in thermal contact with the luminous bodies.

In a spotlight encapsulated by means of the housing a supply of cooling air must nevertheless be possible, to be able to perform a cooling of the luminous bodies as needed depending on the power loss. To this end, an opening is provided through which the cooling air is fed to the heat sinks and/ or from which heated air can be dissipated. The area inside the spotlight

facing this opening is at least protected from spray water.

According to a further embodiment of the invention, the interior of the housing has a water-impermeable separating layer on the side facing away from the window, which separating layer omits the heat sinks and separates the interior of the housing on the side facing the window from the region of the opening. If the spotlight according to the invention is used outdoors, it is advantageous if the housing is at least spray resistant, so that any ingress of water cannot cause damage to the components of the spotlight. In particular, it is particularly advantageous to design the housing in two parts, wherein the two housing parts can be designed to be water-impermeable along their touching edge. In order to form a spray-proof barrier, a separating layer is provided, for example in the form of a film that covers the area between the heat sinks and thus ensures protection. The separating layer is applied between the heatsinks in such a way that an individual pivoting of a group of luminous bodies is possible. To this end the separation layer can be formed with an appropriately selected excess, in order not to hinder movements of adjacent groups of luminous bodies.

In accordance with the invention each group of luminous bodies can be connected to a control unit, which controls each group of luminous bodies with regard to emission angle, wavelength of the electromagnetic radiation and focussing.

For programming the emission properties of the spotlight, a control unit can be provided which can modify each group of luminous bodies appropriately with regard to their geometrical, colour and spatial emission. This control unit can be connected via an interface to a corresponding programming device, wherein it is also possible to provide a control panel on the housing of the spotlight, via which the spotlight can be programmed.

Hereafter, several exemplary embodiments are described in greater detail on the basis of the drawings. Shown are:

Fig. 1 a perspective side view of a spotlight according to the invention in an exploded view,

Fig. 2 the spotlight according to the invention according to Fig. 1 in a partially broken side view,

Fig. 3 a perspective side view of the assembled spotlight of Fig. 1,

Fig. 4 a further perspective side view of the spotlight of Fig. 1,

Fig. 5 a side view of the spotlight according to the invention according to Fig. 1,

Fig. 6A an illustration of the spotlight according to Fig. 1 without housing,

Fig. 6B a detail of the spotlight of Fig. 6A,

Fig. 7 a plan view from the front of the spotlight according to Fig. 1 without the front housing cover,

Fig. 8A a part of a spotlight according to the invention in a plan view,

Fig. 8B the part of Fig. 8A in a side view, and

Fig. 8C the part of Fig. 8A in a cross-sectional view.

In the figures identical or functionally identical parts are labelled with the same reference numerals.

With reference to Figure 1, a spotlight SW according to the invention is shown, which is used for illuminating objects, such as building façades or stage areas. The spotlight SW is shown in Fig. 1 in an exploded view, so that the individual constituent parts of the spotlight SW are at least partially visible. The

spotlight SW has a housing GE, which in the embodiment according to Fig. 1 is designed in a bipartite fashion. The front part GE1 of the housing GE has a frame-shaped outer area AB that surrounds a substantially transparent window FE. The outer area of the first housing part GE1 is designed to be brought into engagement with a second housing part GE2, wherein the second housing part GE2 has an opening OE on the rear side, which is used for supplying cooling air during the operation of the spotlight SW.

On the two side faces SE1 and SE2 the second housing part GE2 has slots AU which correspond with a rotary joint DG of a bracket-like installation element AE. After the merging the first housing part GE1 and the second housing part GE2 surround a frame-shaped mount RA which is in engagement with the rotary joint DG of the installation element AE. Therefore, it is possible to twist the frame-shaped mount RA with respect to the installation element AE, wherein the rotation is performed together with the two halves of the housing GE1 and GE2.

Accordingly, for a basic orientation the spotlight SW can be designed to be rotatable relative to the frame-shaped mount RA and to move together with the housing GE relative to the installation element AE. The installation element AE is designed in the form of a bracket which is provided with a mounting surface, which allows a stable installation of the spotlight SW.

Within the frame-shaped mount RA a plurality of groups GR of the luminous bodies LK are arranged. In the example shown in Fig. 1, there are four groups GR1, ... GR4 provided, each of which is populated with a plurality of luminous bodies LK. In each of the groups GR1, ... GR4 of the luminous bodies LK the individual luminous bodies LK are arranged next to one another, so that a bar-shaped lighting element is formed consisting of the individual luminous bodies LK for each of the groups GR1, ... GR4.

In addition to the rotation of the frame-shaped mount RA with respect to the installation element AE on the rotary joint DG,

each of the groups GR1, ... GR4 of the luminous bodies LK can be pivotable, wherein the pivoting capability can be implemented for each group GR1, ... GR4 independently of each other.

With reference to Fig. 2,the pivotability of the individual groups GR1, ... GR4 will be explained again in more detail.

Each of the groups GR1, ... GR4 of the luminous bodies LK is provided with rotation spindles DA on opposite sides of an elongated body GK, which engage in the two side parts ST1 and ST2 of the frame-shaped mount RA. It is evident that an intervention is provided in each case on the side part ST1 for a rotation spindle DA assigned to the main body GK, in order to ensure the individual pivotability for the respective group GR of the luminous bodies LK about the rotation spindle DA.

In addition, Fig. 2 shows that each luminous body LK is equipped on its rear side with a heat sink KK, which in operation can be supplied with cooling air by a fan LF. In Fig. 2 a corresponding fan mount LH is shown, which can accommodate, for example, two adjacently placed fans LF. The position of the fans LF is shown, for example, by the protective grilles SG illustrated in Fig. 1, which are used to cover the fan LF. An axial fan can be provided, for example, as the fan LF.

Fig. 3 shows a fully assembled spotlight SW. The two halves of the housing GE1 and GE2 are joined together such that they now cover the frame-shaped mount RA, so that a compact design of the spotlight SW is obtained. The bracket-shaped installation element AE can then be designed in such a way that in its foot section, i.e. in the portion located underneath the two halves of the housing GE1 and GE2, can receive a power supply for operating the luminous bodies LK as well as any additional control modules or electronic components. Since power supplies usually have a relatively high weight compared to the luminous bodies LK, such an approach could increase the stability of the spotlight SW. Likewise, however, the power supply and other control modules or electronic components can be arranged in the

housing GE. Also, corresponding cable feeds can preferably be provided in the second housing part GE2 for controlling the spotlight SW.

Fig. 4 shows the fully assembled spotlight SW from the rear side shown in a side elevation. Through the opening OE cooling air can be passed via the fan LF to the heat sinks KK, so that the electronics completely encapsulated inside the housing GE is sufficiently cooled.

The two parts of the housing GE 1 and GE2 are interchangeable, so that they can be matched to their respective environments with regard to their visual appearance by replacing them with a different design variant. The window FE provides protection against environmental influences such as dust or water, and also prevents contact with the luminous bodies LK, which can have a positive impact on the service life of the spotlight SW.

Fig. 5 shows the spotlight SW again in a side elevation. In this view it is particularly important to note that the two housing parts GE1 and GE2 are joined together so that no water can enter along their contact edge BK. Since such spotlights SW are often intended to be operated outdoors, at least spray-water protection is essential.

While given an appropriate design no water can enter through the window FE arranged on the front side, it is possible, however, and for a long-lasting operation of the luminous bodies LK even essential, that the rear opening OE is not closed, to allow the supply of cooling air during operation. Nevertheless, in order to be able to provide adequate protection against water spray, a water-impermeable layer is arranged within the housing, as will be explained in more detail below. Thus, even from the rear side no water spray can penetrate into the electronics of the luminous bodies LK via the opening OE.

Fig. 6A shows the spotlight SW again in a different view, in which the two housing parts GE1 and GE2 are removed.

Each group GR1, ... GR4 of luminous bodies LK has the elongated base body GK, on which the luminous bodies LK are arranged. The elongated base bodies of the groups of luminous bodies can be arranged parallel to each other along their longitudinal axes. Each luminous body LK is provided with a lens LI for focusing the emitted electromagnetic radiation, which lenses for each group GR1, ... GR4 of luminous bodies TK are arranged on a carrier plate TP. The carrier plate TP is advantageously connected device to the elongated body GK, so that the focus setting of the group GR1, ... GR4 of luminous bodies LK is adjusted by varying the distance between the carrier plate TP and the elongated body GK. The variation of the distance is carried out via a motorized control. To achieve this a first belt RI1 is provided, which is driven by a motor drive and via idler wheels, guides and the like, changes the distance between the carrier plate TP and the elongated base body GK.

The area marked with the reference symbol A in Fig. 6A is shown again in Fig. 6B enlarged. On the front side of the spotlight SW each of the luminous bodies LK is fitted with the lens LI, which is connected via a fibre-optic cable LL to a LED. The heat sink KK is located on the rear side of the base body GK.

Accordingly, compact luminous bodies LK are created, which can be arranged next to one another on the base body GK in a space saving manner. For each group, GR1, ... GR4 of the luminous bodies LK, the pivotability with respect to the rotation spindle DA can be adjusted individually via a motorized control and the radiation characteristic can be influenced by means of the lens LI. For the adjustment of the pivotability with respect to the rotation spindle. For the adjustment of the pivotability with respect to the rotation spindle DA a motorized control is also provided, which acts on the group GR of luminous bodies LK via a second belt RI2. Therefore, it is possible to affect the electromagnetic radiation emitted by the luminous bodies LK of a group GR, both in terms of the emission angle and the focal range. The illumination field resulting from illuminating an

area can therefore be selected for each group with regard to dimensions and/or light intensity, so that a uniform illumination can be achieved in the event of a change in the emission angle.

Fig. 7 shows the spotlight of Fig. 6A again in a plan view. It is apparent that the individual base bodies GK are designed with adjacent lenses LI, which are individually pivotable using an appropriate motorized control, which are indicated in Fig. 7 with the reference symbols SM for the pivoting and ZM for the focusing.

The advantage of this approach can be illustrated most simply if one imagines that the spotlight SW is arranged at a fixed distance in front of a vertical wall. If the group GR1 of the spotlight SW illuminates the wall of the object under a first angle and the group GR2 emits under a second angle different to the first angle, both groups would cover a different sized exposure field on the wall of the object without a change in the respective focus. By changing the focussing of each group and, if necessary, adjusting the intensity of the luminous bodies LK the optical impression in any illumination field can therefore be shaped in almost the same way.

Fig. 8A shows a group GR again in a plan view. On the one side of the base body GK, the motorized control ZM is arranged, the opposite side is provided with a rotation spindle DA.

The supply of light is described in more detail on the basis of the side view of Fig. 8B. The Lens LI is visible, which is connected via a fibre-optic cable LL to an LED module, not shown in Fig. 8B. On the rear side of the base body GK each luminous body LK is fitted with a heat sink KK.

A cross-sectional view of a luminous body LK is shown in Fig. 8C. The cross section follows a cut line perpendicular to the plane of the drawing along the line A-A' from Fig. 8A. The arrangement consisting of heat sink KK, fibre-optic LL, Lens LI

and the corresponding LED can be seen.

The housing GE is designed with the opening OE for feeding cooling air, which reaches the heat sinks KK in thermal contact with the luminous bodies LK. The area inside the spotlight SW facing this opening OE is designed to be at least protected from spray water. To this end, the interior of the housing GE has a water-impermeable separating layer TF on the side facing away from the window FE, which separating layer omits the heat sinks KK and therefore separates the interior of the housing GE on the side facing the window FE from the region of the opening OE. The separating layer TF is provided in the form of a film that covers the area outside of the heat sinks KK. The separating layer TF is applied between the heatsinks KK in such a way that an individual pivoting of a group GR of luminous bodies LK is possible. To this end, the separation layer can be formed with an appropriately selected excess, in order not to hinder movements of adjacent groups GR of luminous bodies LK. The separating layer TF is held in position with a film holder FH, which is clamped at suitably selected retaining points.

For programming the emission properties of the spotlight SW, a control unit can be provided, which can appropriately modify each group of luminous bodies with regard to their geometrical, colour and spatial emission. This control unit can be connected via an interface to a corresponding programming device, wherein it is also possible to provide a control panel on the housing of the spotlight, via which the spotlight can be programmed.

The features specified above and in the claims and those derivable from the figures can be advantageously realized both individually as well as in different combinations. The invention is not limited to the exemplary embodiments described above, but can be varied in various ways by applying the knowledge of the person skilled in the art.

Patentkrav

1. Projektør til belysning af et objekt, især en bygningsfacade eller et sceneområde, hvilken projektør omfatter et hus (GE) og en lyskilde, der genererer elektromagnetisk stråling i et område, der kan opfattes af det menneskelige øje, hvor lyskilden har et multiplum af lyselementer (LK), der er anbragt i flere grupper (GR1, GR2, GR3, GR4), hvor hver af grupperne (GR1, GR2, GR3, GR4) af lyselementer (LK) kan svinges individuelt i forhold til huset, således at hver af grupperne (GR1, GR2, GR3, GR4) af lyselementer kan belyse objektet i et belysningsfelt, der er henvist til den respektive gruppe (GR1, GR2, GR3, GR4) af lyselementer (LK), hvor grupperne (GR1, GR2, GR3, GR4) af lyselementer (LK) hver især har en indstillelig fokusering, således at der på det objekt, der skal belyses, ved forskellige belysningsfelter kan indstilles samme dimensioner og/eller belysningsintensiteter, hvor hver af gruppen (GR1, GR2, GR3, GR4) af lyselementer (LK) med henblik på svingbarhed er forsynet med en drejeaksel (DA), som indgriber i en holder i husets (GE) indre, hvor hver gruppe (GR1, GR2, GR3, GR4) af lyselementer (LK) kan forbindes med en styreenhed, der styrer hver gruppe (GR1, GR2, GR3, GR4) af lyselementer (LK) med hensyn til udstrålingsvinkel, bølgelængde af den elektromagnetiske stråling og fokusering, kendetegnet ved, at hvert lyselement (LK) er forsynet med en linse (LI), der er egnet til fokusering af den udstrålede elektromagnetiske stråling, og som for hver gruppe (GR1, GR2, GR3, GR4) af lyselementer (TK) er anbragt på en bærerplade (TP).

2. Projektør ifølge krav 1, ved hvilken holderen er udformet som ramme.

3. Projektør ifølge krav 1 eller 2, ved hvilken der er indrettet to drejeaksler (DA), der er lejret drejeligt i holderen (RA) på modstående sider af gruppen (GR1, GR2, GR3, GR4) af lyselementer (LK).

4. Projektør ifølge et af kravene 1 til 3, ved hvilken hver

gruppe (GR1, GR2, GR3, GR4) af lyselementer (LK) har et aflangt grundlegeme (GK), på hvilket lyselementerne (LK) er anbragt.

5. Projektør ifølge krav 4, ved hvilken de aflange grundlegemer (GK) for grupperne (GR1, GR2, GR3, GR4) af lyselementer (LK) er anbragt langs deres længdeakser.

6. Projektør ifølge krav 5, ved hvilken bærerpladen (TP) kan justeres, sådan at fokuseringen kan indstilles for hver af grupperne (GR1, GR2, GR3, GR4) af lyselementer (LK) via den justerbare bærerplade (TP).

7. Projektør ifølge et af kravene 1 til 6, ved hvilken lyselementerne (LK) i det mindste delvist er udført om lysdioder.

8. Projektør ifølge et af kravene 1 til 7, ved hvilken huset (GE) omslutter holderen, hvor holderen (RA) er forbundet drejeligt med et opstillingselement (AE).

9. Projektør ifølge krav 8, ved hvilken huset (GE) er udført flerdelt, især todelt, hvor husets (GE) dele kan udskiftes.

10. Projektør ifølge et af kravene 1 til 9, ved hvilken huset (GE) på sin forside har et vindue (FE) der kan gennemtrænges af den elektromagnetiske stråling.

11. Projektør ifølge krav 10, ved hvilken huset (GE) er udført med en åbning (OE) til tilførsel af køleluft, der kan ledes hen på kølelegemer (KK), der står i termisk kontakt med lyselementerne (LK).

12. Projektør ifølge krav 11, ved hvilken husets (GE) indre på den fra vinduet (FE) bortvendte side har et vanduigennemtrængeligt skillelag (TF), som udsparer kølelegemerne (KK) og adskiller husets (GE) indre på den mod vinduet (FE) vendte side af åbningens (OE) område.

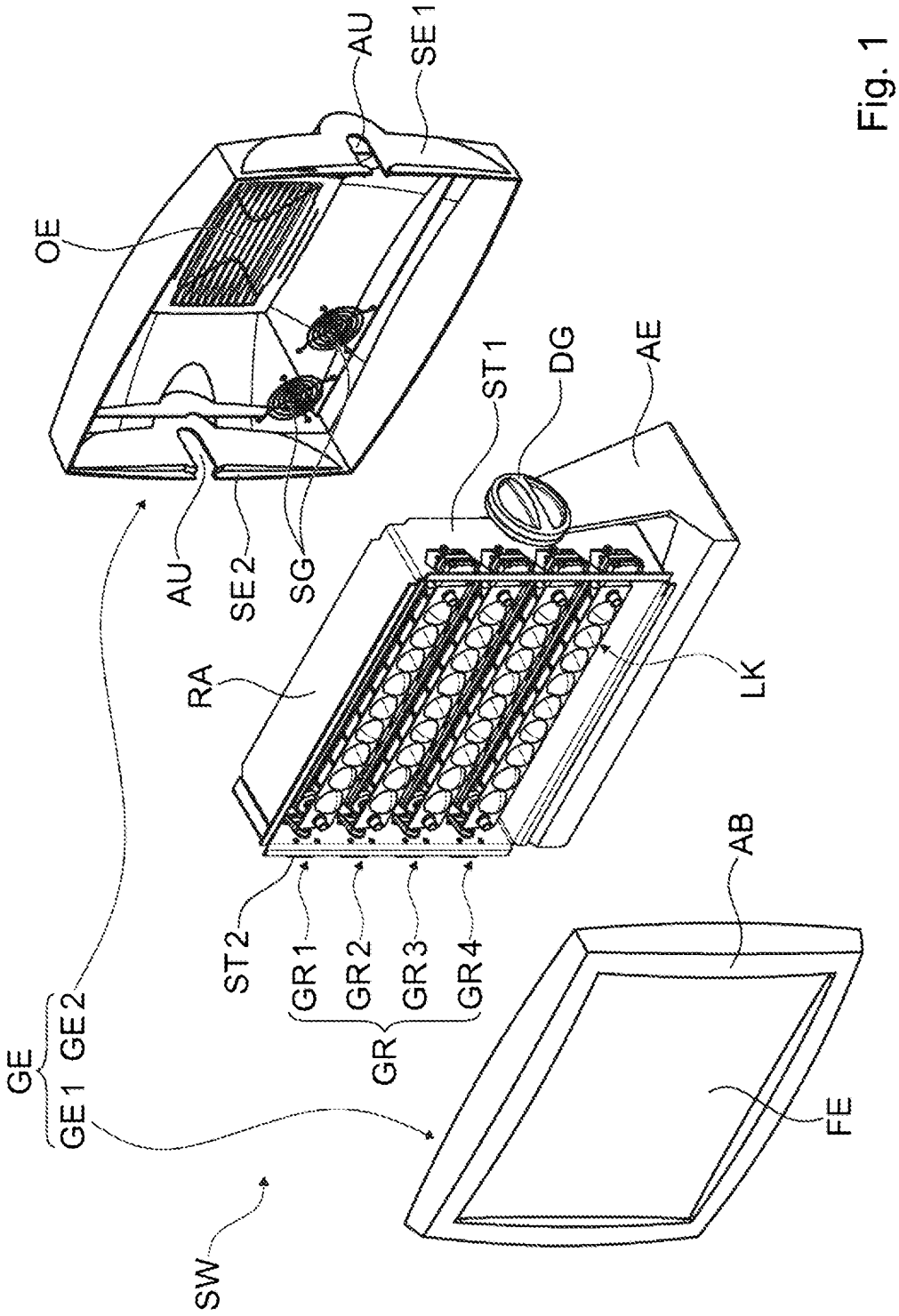
AU
SE1
OE
ST1
DG
AE
AU
SE2
SG
RA
LK
AB
ST2
GR1
GR2
GR3
GR4
GR
GE
GE1
GE2
FE
SW

Fig. 1

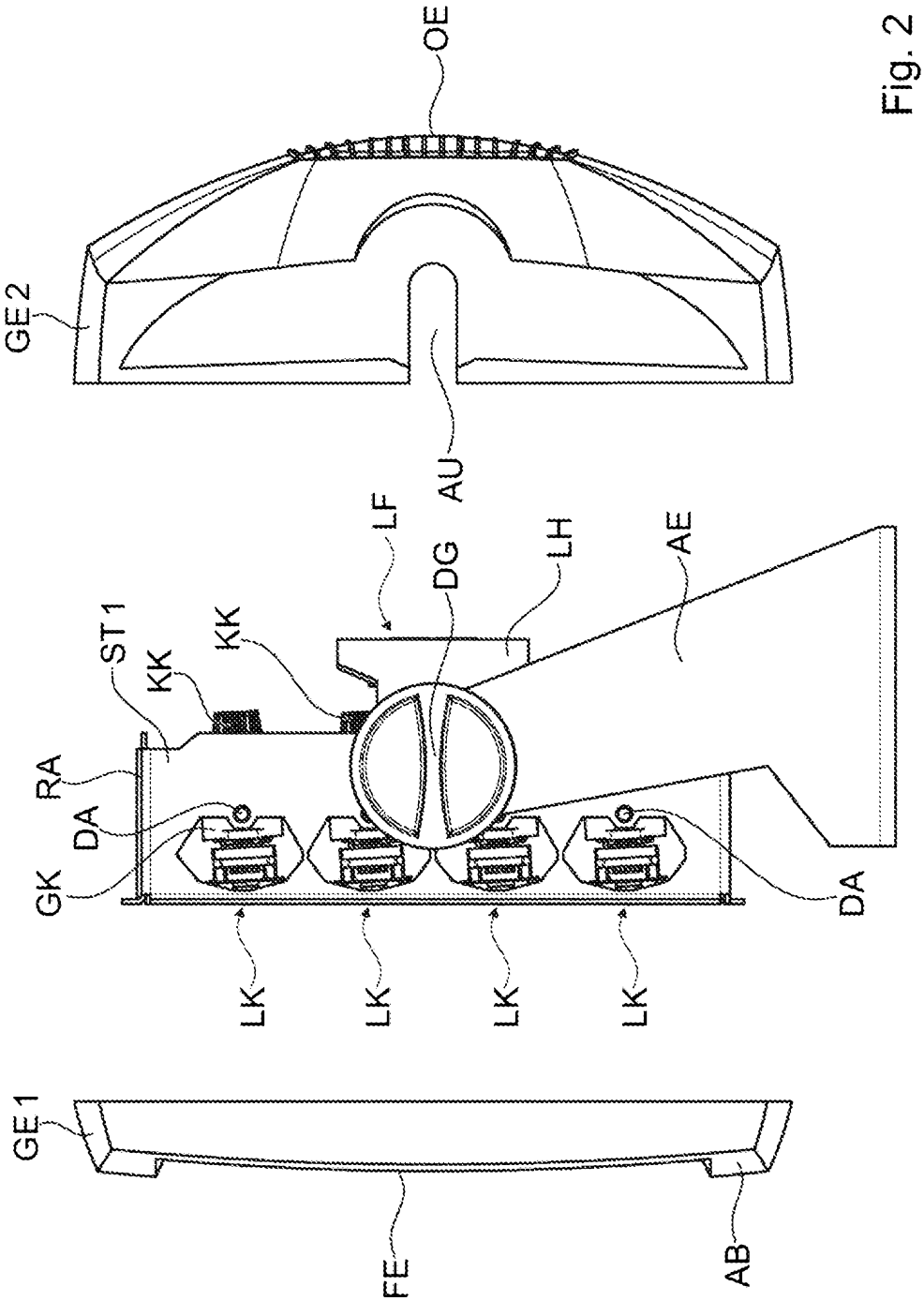

Fig. 2

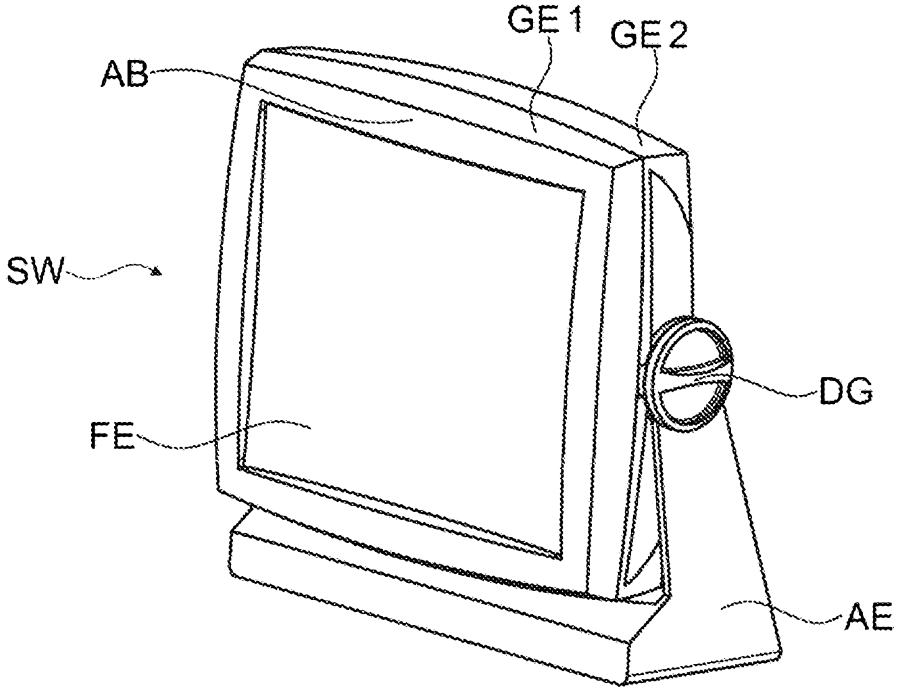

Fig. 3

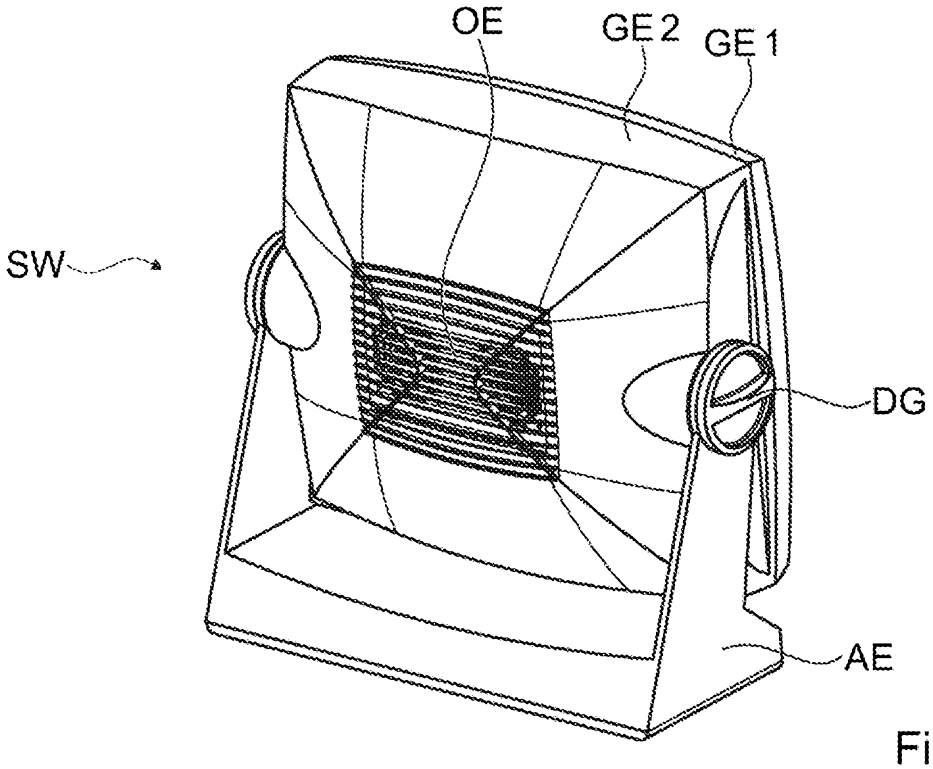

Fig. 4

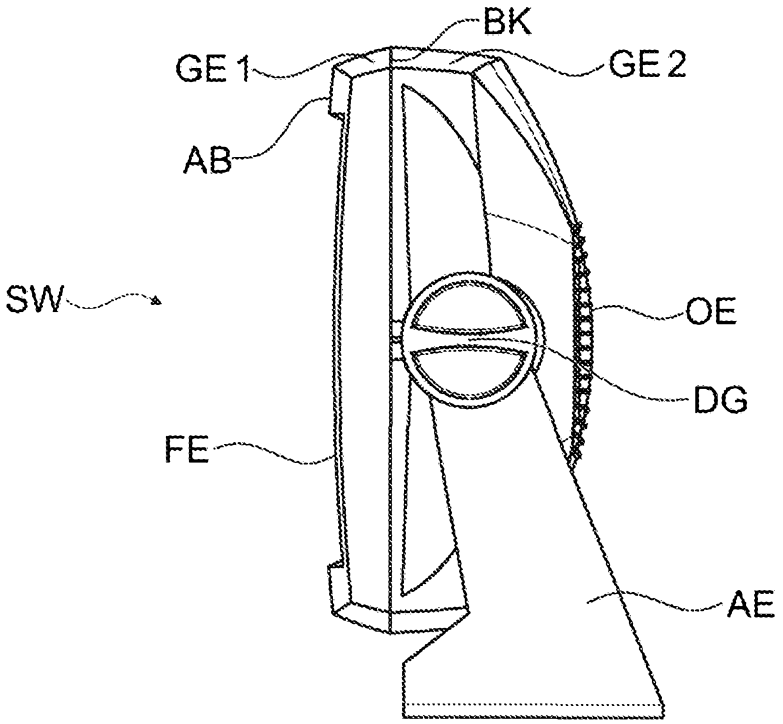
BK
GE 1
GE 2
AB
SW
OE
DG
FE
AE

Fig. 5

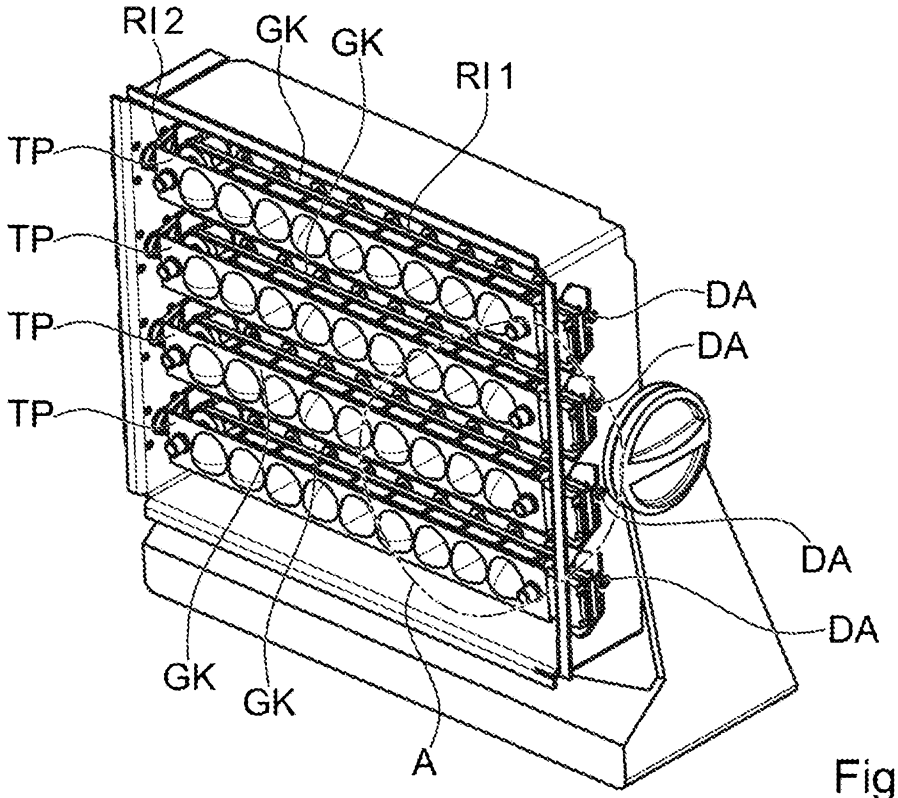
RI 2
GK
GK
RI 1
TP
TP
TP
TP
DA
DA
DA
DA
GK
GK
A

Fig. 6A

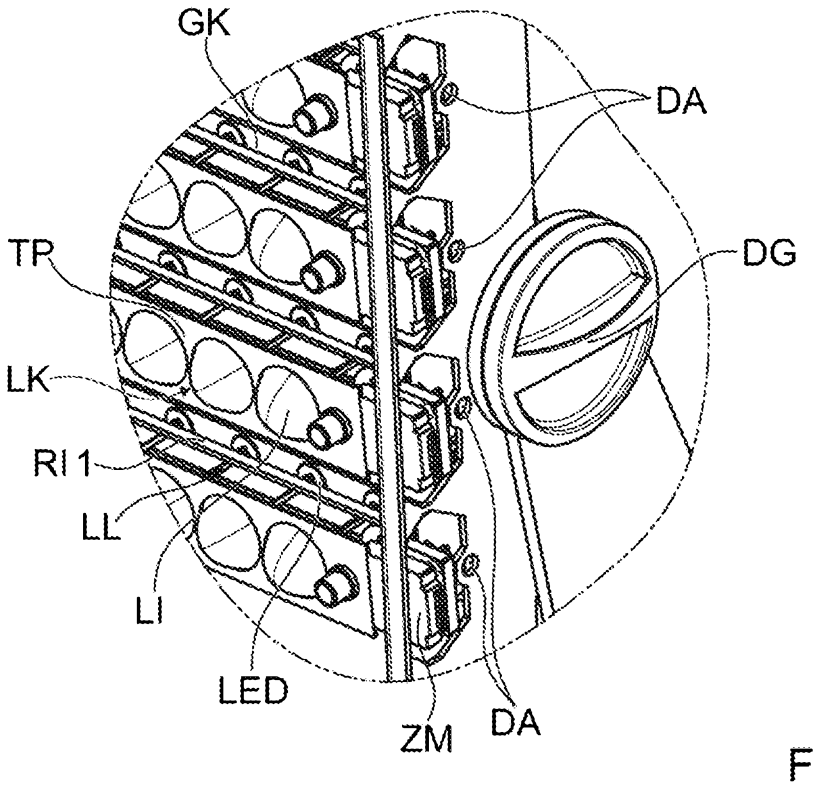
GK
DA
TP
DG
LK
RI 1
LL
LI
LED
ZM
DA

Fig. 6B

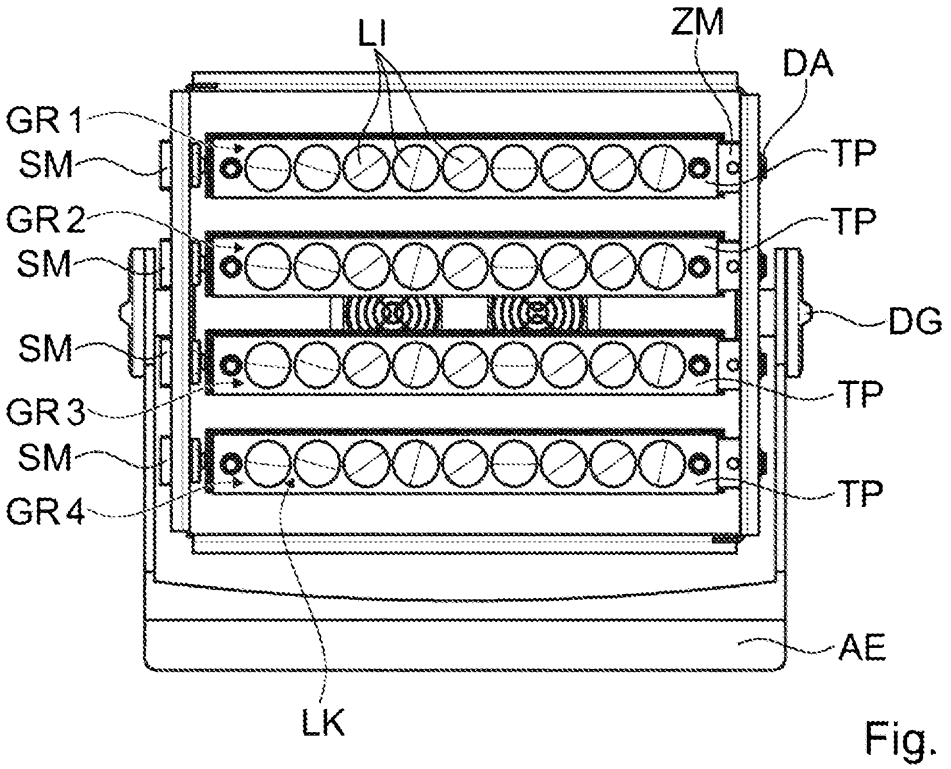
LI
ZM
DA
GR 1
SM
TP
GR 2
TP
SM
DG
SM
TP
GR 3
SM
TP
GR 4
AE
LK

Fig. 7

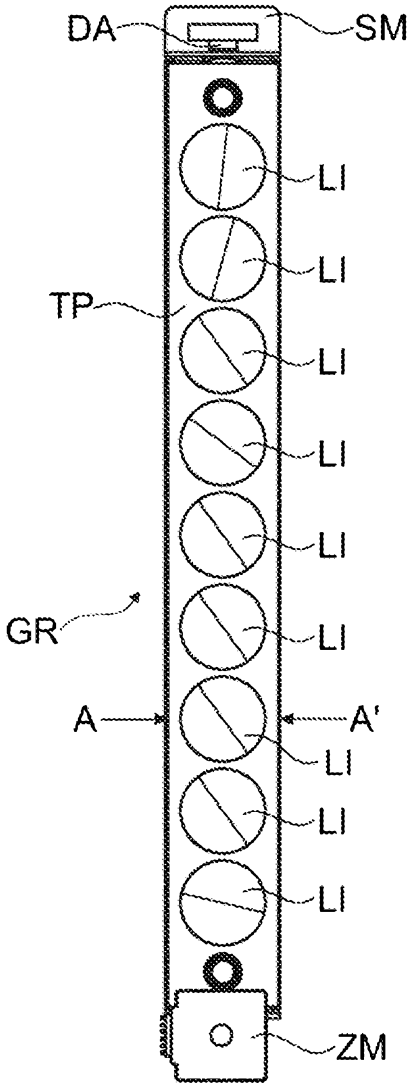
DA
SM
LI
LI
TP
LI
LI
LI
LI
GR
LI
A
A'
LI
LI
LI
ZM

Fig. 8A

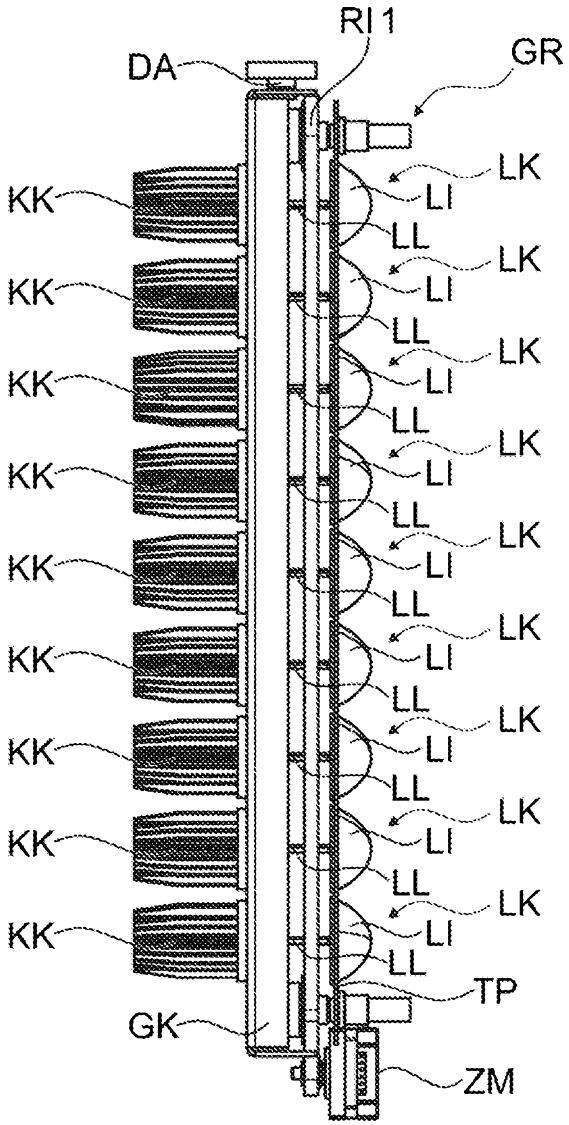
RI 1
DA
GR
KK
KK
KK
KK
KK
KK
KK
KK
KK
LK
LI
LL
LK
LI
LL
LK
LI
LL
LK
LI
LL
LK
LI
LL
LK
LI
LL
LK
LI
LL
LK
LI
LL
TP
GK
ZM

Fig. 8B

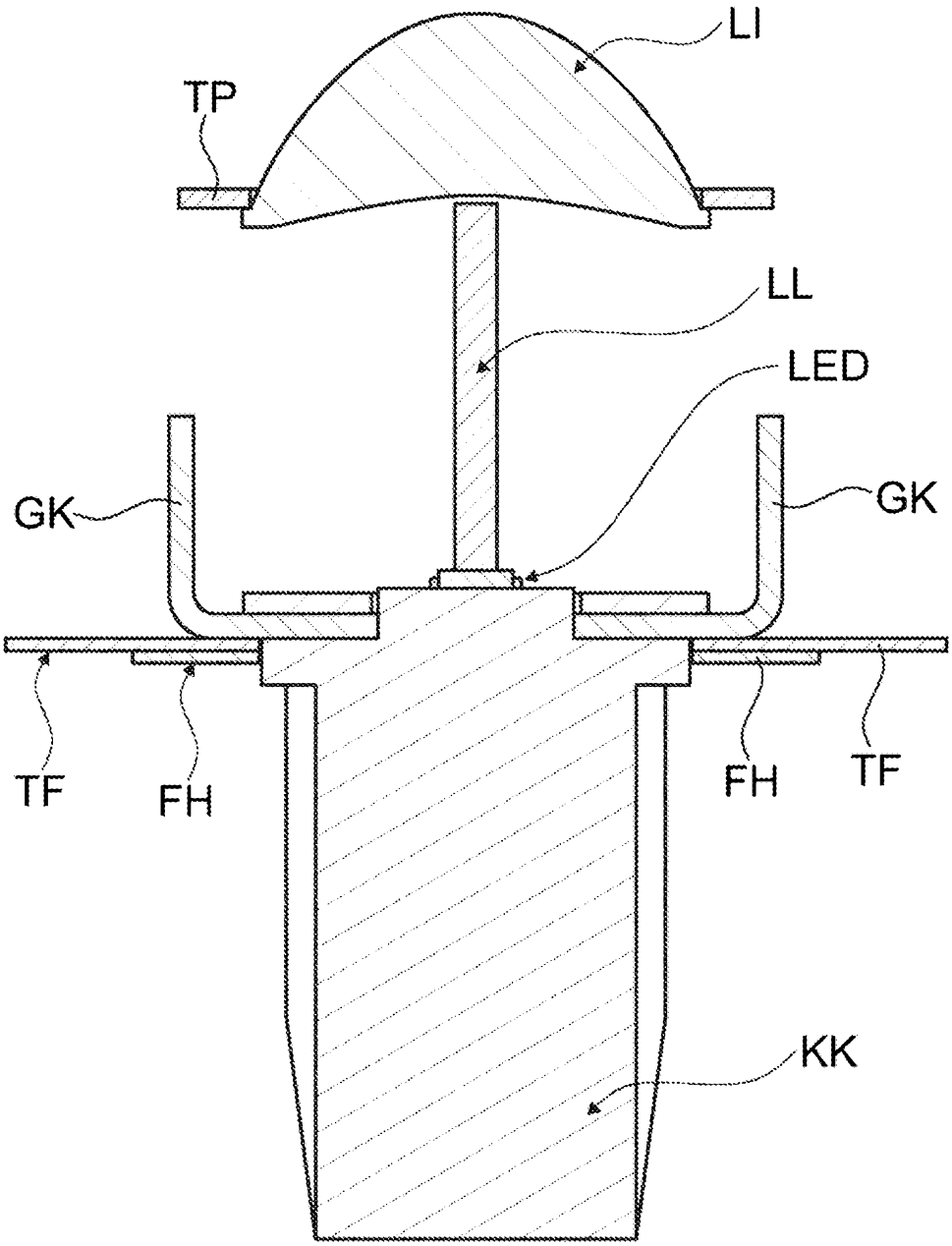

Fig. 8C