

EUROPEAN PATENT SPECIFICATION

- (45) Date of publication of patent specification: **16.08.90** (51) Int. Cl.⁵: **F 21 V 5/02**
(21) Application number: **85201596.5**
(72) Date of filing: **03.10.85**

(54) **Illumination unit.**

(30) Priority: **09.10.84 NL 8403064**

(43) Date of publication of application:
16.04.86 Bulletin 86/16

(45) Publication of the grant of the patent:
16.08.90 Bulletin 90/33

(84) Designated Contracting States:
BE DE FR GB IT NL

(56) References cited:
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DE-C- 288 835
FR-A-1 448 734
GB-A- 762 769
GB-A-2 072 942
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(70) Proprietor: **N.V. Philips' Gloeilampenfabrieken**
Groenewoudseweg 1
NL-5621 BA Eindhoven (NL)

(72) Inventor: **Holten, Petrus Adrianus Josephus**
c/o INT. OCTROOIBUREAU B.V. Prof. Holstlaan 6
NL-5656 AA Eindhoven (NL)

(74) Representative: **Rolfes, Johannes Gerardus**
Albertus et al
INTERNATIONAAL OCTROOIBUREAU B.V. Prof.
Holstlaan 6
NL-5656 AA Eindhoven (NL)

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EP 0 178 019 B1

Description

The invention relates to an illumination unit comprising a light source, which is surrounded at least in part by a transparent wall portion provided with a prismatic refraction profile, whose refracting ribs are substantially linear, the refraction profile being in the form of grooves provided in the surface of the wall portion remote from the light source and consisting of side walls intersecting each other and having a curved cross-section, the walls of adjacent grooves meet and form the ribs at this area. Such an illumination unit is known from FR—A—1 448 734.

In said FR—A—1 448 734 a luminaire for diffusing light from a light source (such as a lamp) is described the prismatic refraction profile being present on the side walls of a somewhat extending transparent wall portion of a housing. This transparent wall portion generally is not provided with such a profile. If the device is mounted to a ceiling or wall with help of the said refraction profile — the wall or ceiling is illuminated as well. However, with the above device it is difficult to obtain a uniform brightness over the entire surface of the transparent wall portion of the luminaire.

An illumination unit is also known in the form of a compact low-pressure mercury vapour discharge lamp, which serves as an alternative to an incandescent lamp for general illumination purposes, a luminescent discharge tube of the lamp being curved at a number of areas and being surrounded by a substantially cylindrical envelope closed on one side. The outer wall of the envelope is provided with a refraction profile, whose refracting ribs on the cylindrical part extend parallel to the longitudinal axis of the envelope. Such a lamp is described in Netherlands Patent Application 8001833 laid open to public inspection.

In this lamp, the light originating from the discharge tube is refracted and scattered by means of the said refraction profile, which results in the light-emitting part of the lamp having a reasonably uniform brightness. However, it has been found that especially with the use of a light source having a high luminance (such as the discharge tube of the aforementioned lamp) the brightness is nevertheless distributed with insufficient uniformity over the surface of the envelope and the light can be dazzling for an observer.

The invention has for its object to provide an illumination unit provided with a refraction profile by means of which the light originating from the light source is refracted so that the outer surface of the wall portion, which surrounds the light source at least in part, has more uniform brightness, while at the same time the light is less dazzling than in the known illumination unit.

For this purpose, according to the invention, an illumination unit of the kind mentioned in the opening paragraph is characterized in that the grooves of the refraction profile in the wall portion are alternately deep and shallow, the curva-

ture of the walls of the deep grooves being smaller than that of the walls of the shallow grooves.

Due to the presence of the said refraction profile, the light originating from the light source is refracted and scattered by the wall portion (which preferably consists of a transparent synthetic material) to a considerably greater extent than in the known devices. It has been found that the wall portion in the illumination unit according to the invention has a surprisingly uniform brightness substantially throughout its surface. It has further been found that the strongly refractive effect of the refraction profile does not influence the intensity of the emanating light.

The extent of the different curvatures of the two side walls of the grooves and the shape (concave or convex), the angle the two side walls of a groove enclose near their line of intersection, the angle two adjacent curved walls enclose with each other at the area of a rib and the combination of the said groove shapes in a profile are determinative of the degree of refraction and the extent of scattering of the light. These quantities strongly depend upon the use of the illumination unit.

When the illumination unit is in the form of a luminaire for tubular discharge lamps (such as luminescent low-pressure mercury vapour discharge lamps), the wall portion takes the form of a substantially flat transparent plate which serves to close an elongate housing in which the said light sources are arranged. The ribs of the profile extend preferably parallel to the longitudinal axes of these lamps. The illumination unit is preferably used as a part of a road illumination luminaire, in which the light source is, for example, a high pressure sodium vapour discharge lamp. The light originating from the wall portion is substantially not dazzling. In such a luminaire for example the ribs of the refraction profile extend parallel to the longitudinal axis of a cylindrical wall portion. The refraction profile is then preferably located on the surface of the wall portion remote from the lamp in order to obtain an optimum light scattering.

In another embodiment the unit is also constructed as road luminaire which comprises a housing in which the light source can be included. This housing is provided with a conically extending transparent wall portion which is provided with a refraction profile in accordance with the invention. The refracting ribs and the grooves then extend from the narrowest part to the widest part of the said conical wall portion. Due to the presence of the said reaction profile (which is preferably present on the inner side of the wall portion), a homogeneous luminance distribution is obtained throughout the wall portion, the possibility of dazzling being small. Such a luminaire is very suitable to be used for illumination of roads and streets in residential areas.

In a practical embodiment the unit is a low pressure mercury vapour discharge lamp, the envelope of which has a cylindrical shape accord-

ing to the aforementioned Netherlands Patent Application 8001833 laid open to public inspection. Also the envelope can be spherical, with the ribs extending from the upper side of the envelope towards the lamp cap.

Embodiments of the invention will now be described more fully with reference to the accompanying drawing.

In the drawing:

Fig. 1 shows partly in elevation and partly broken away a low-pressure mercury vapour discharge lamp according to the invention;

Fig. 2 shows, also in elevation, an illumination luminaire according to the invention;

Fig. 3 shows in cross-section a part of the outer wall of the transparent wall portion of the lamp shown in Fig. 1, and

Fig. 4 shows another embodiment of a luminaire according to the invention.

The lamp shown in Fig. 1 comprises a cylindrical lamp envelope 1 which is sealed slightly spherically on one end and consists of a transparent synthetic material. Within this lamp envelope is arranged a comparatively thin discharge tube 2 which is sealed in a vacuum-tight manner and is folded three times so as to form a hook. At the ends of the tube there are arranged two electrodes (not shown in the drawing), between which a discharge is maintained during operation of the lamp. The inner wall of the discharge tube 2 is provided with a luminescent layer 3, which converts the ultraviolet radiation produced in the mercury discharge into visible light. The lamp further comprises an electrical stabilization ballast 4, a starter (not shown) and a thinwalled slightly conical lamp bowl 5 of synthetic material. The latter is secured to the lamp envelope 1 and is provided at its conical end with an Edison lamp cap 6, by means of which the lamp can be screwed into a fitting intended for incandescent lamps. The outer walls of the lamp envelope is provided with a prismatic refraction profile, whose refracting ribs (7a, 7b etc.) extend parallel to the longitudinal axis (8) of the lamp. On the sealed upper end of the envelope the said ribs have a circular form centred on the longitudinal axis of the cylinder.

The refraction profile is in the form of grooves provided in the surface of the envelope. This profile will be described more fully with reference to Fig. 3.

In Fig. 2, a road illumination luminaire 10 according to the invention is mounted on a lighting column 11. The luminaire has a housing 12 of synthetic material which is closed on the lower side by a dish-shaped transparent glass hood 13. The housing accommodates an electrical gas discharge lamp 14 (shown in dotted lines) which acts as a light source and is surrounded by a cylindrical wall portion 15 of synthetic material, which is provided at its surface remote from the light source with a refraction profile according to the invention. The refracting ribs (16a, 16b etc.) extend parallel to the longitudinal axis of the cylinder and to the longitudinal axis of the lamp

14. Due to the presence of the said cylinder of synthetic material, the light originating from the light source is refracted so that for an observer at a certain distance from the luminaire it seems as if the light source has a size corresponding to the outer diameter of the cylinder. The light originating from the luminaire is then not dazzling.

Fig. 3 shows a cross-section of the refraction profile in detail, as present on the outer surface of the lamp shown in Fig. 1. The refraction profile of the cylindrical wall portion 15 of the luminaire of Fig. 2 is generally similar. The profile consists of adjacent grooves 18a, 19a, 18b, 19b etc. Each groove consists of side walls, whose surface have a concave shape. The grooves are alternately shallow (18a, 18b) and deep (19a, 19b). The curvature of the walls (20, 21) of the deep grooves is smaller (the radius of curvature is bigger) than that of the walls (22, 23) of the shallow grooves. The walls (20, 21 and 22, 23, respectively) of the said grooves meet one another continuously so as to form a continuous line of intersection. This line of intersection is indicated by reference numeral 24 for groove 19a and is indicated by reference numeral 25 for groove 18b. The curved side walls of the groove 19a enclose an angle α of about 80° with each other. Of the groove 18b the angle α is about 150° . The refracting ribs of the prismatic refraction profile are formed by the line of intersection of walls of two adjacent grooves, for example rib 26, which is formed by the walls 21 and 22 of adjacent grooves 19a and 18b.

In practice, the curved sidewalls of the grooves do not always meet in such a manner that a sharp line is formed. Due to the manufacturing process, a small flat surface is formed at the area of the lines of intersection shown. The angles α and β are then calculated by extrapolation of the relevant sidewalls. Their aforementioned values are maintained.

In a practical embodiment of the road illumination luminaire shown in Fig. 2, the outer diameter of the cylindrical wall portion is 25 cm. The thickness of the wall is 5 mm. The depth of the grooves is 3 mm and 1,5 mm, respectively. The distance between the ribs extending parallel to the longitudinal axis is 3 mm. When arranged on the top of a vertical column having a length of about 4m, by means of a high-pressure sodium vapour discharge lamp having a power of 50 W present in the luminaire (S0N-50W, 3300 1m), a substantially constant brightness was obtained throughout the circumference of the luminaire.

The road illumination shown in Fig. 4 comprises a housing 30 which is mounted on a lighting column 31, the housing comprises a transparent conical wall portion 32 which is in the form of a hood of synthetic material and is provided on the inner side with a refraction profile in accordance with the invention. The profile consists of adjacent grooves having a configuration as shown in Fig. 3. Both the ribs and the grooves extend from the upper side to the lower side, i.e. in substantially vertical direction. The ribs are diagrammatically denoted by reference

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numeral 33. The light source 34, for example a high-pressure sodium vapour discharge lamp, is preferably arranged in the longitudinal direction and is indicated in the drawing by dotted lines. The ribs are formed by the meeting curved wall portions of two adjacent grooves. In this case, in contrast with Fig. 3, a line of intersection is not formed. However, due to the manufacturing process, the ribs are slightly flattened. Furthermore, the depth of the grooves is smaller at the narrowest part of the wall portion than at the widest part thereof.

Claims

1. An illumination unit comprising a light source (2) which is surrounded at least in part by a transparent wall portion (1) provided with a prismatic refraction profile, whose refracting ribs (7a, 7b) are substantially linear, the refraction profile being in the form of grooves (18a, 19a, 18b, 19b) provided in the surface of the wall portion remote from the light source and consisting of side walls intersecting each other and having a curved cross-section, the walls of adjacent grooves meet and form the ribs at this area, characterized in that the grooves are alternately deep (19a, 19b) and shallow (18a, 18b), the curvature of the walls of the deep grooves (19a, 19b) being smaller than that of the walls of the shallow grooves (18a, 18b).

2. An illumination unit comprising a housing (30) in which the light source (34) can be included, which housing is provided with a conically extending transparent wall portion (32), characterized in that the wall portion (32) is provided with a refraction profile as claimed in Claim 1, the refracting ribs (33) and the grooves extending from the narrowest part to the widest part of the conical transparent wall portion.

Patentansprüche

1. Beleuchtungskörper mit einer Lichtquelle (2), die wenigstens teilweise von einer durchsichtigen Wandung (1) mit einem prismatischen Brechungsprofil umgeben ist, dessen Brechungsrippen (7a, 7b) im wesentlichen linear verlaufen, das Brechungsprofil in der Form von Rillen (18a, 19a, 18b, 19b) im Abstand von der Lichtquelle in der Wandungsoberfläche angebracht ist, aus einander schneidenden Seitenwänden besteht und

einen gekrümmten Querschnitt besitzt, und die Wände der benachbarten Rillen zusammenkommen und in diesem Bereich die Rippen bilden, dadurch gekennzeichnet, daß die Rillen abwechselnd tief (19a, 19b) und untief (18a, 18b) sind, und die Krümmung der Wände der tiefen Rillen (19a, 19b) geringer ist als die Krümmung der Wände der untiefen Rillen (18a, 18b).

2. Beleuchtungskörper mit einem Gehäuse (30), in das die Lichtquelle (34) aufgenommen werden kann, wobei das Gehäuse mit einer sich konisch erstreckenden durchsichtigen Wandung (32) ausgerüstet ist, dadurch gekennzeichnet, daß diese Wandung (32) ein Brechungsprofil nach Anspruch 1 aufweist, dessen Brechungsrippen (33) und die Rillen sich vom engsten Teil bis zum weitesten Teil der konischen durchsichtigen Wandung erstrecken.

Revendications

1. Dispositif d'illumination comportant une source lumineuse qui est au moins partiellement entourée d'une partie de paroi transparente (1) munie d'un profil de réfraction prismatique, dont les arêtes réfringentes (7a, 7b) sont pratiquement linéaires, le profil de réfraction étant sous forme de rainures (18a, 19a, 18b, 19b) réalisées dans la surface de la partie de paroi opposée à la source lumineuse et constituées par des parois latérales qui se coupent et qui présentent une section transversale courbée, les parois des rainures adjacentes se rencontrent et constituent les arêtes à cet endroit, caractérisée en ce que les rainures du profil de réfraction dans la partie de paroi sont alternativement profondes (19a, 19b) et peu profondes (18a, 18b), la courbure des parois des rainures profondes (19a, 19b) étant inférieure à celle des parois des rainures peu profondes (18a, 18b).

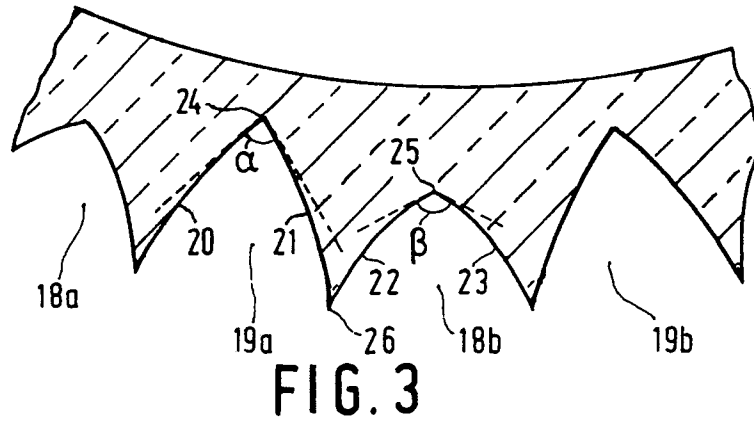
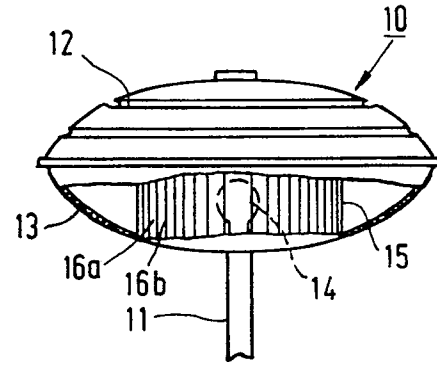
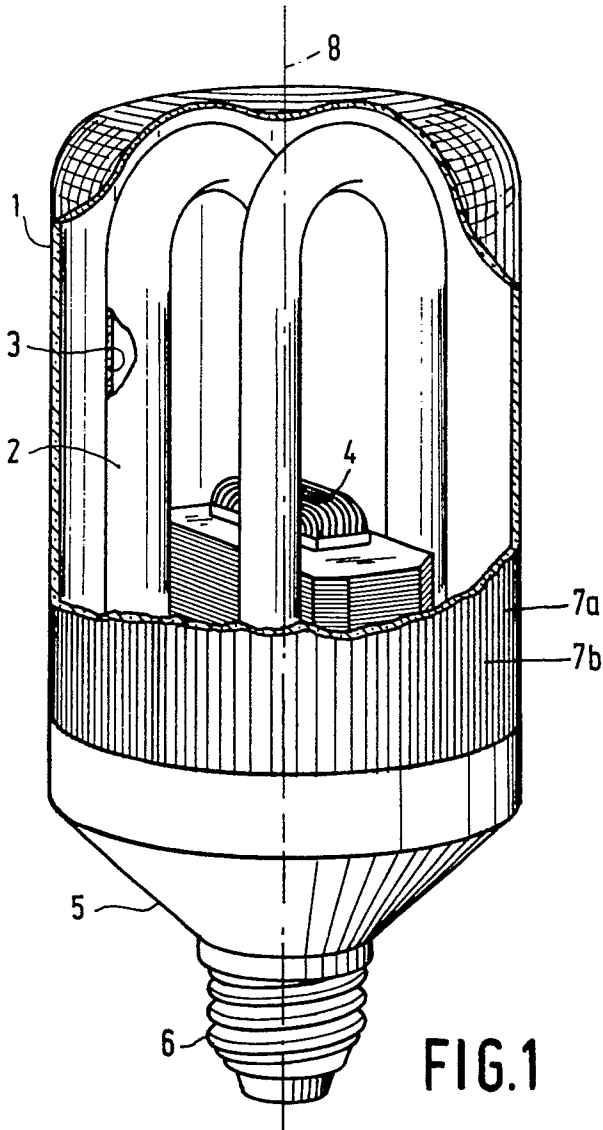
2. Dispositif d'illumination comportant un boîtier (30) dans lequel peut être disposée une source lumineuse (34), lequel boîtier est muni d'une partie de paroi transparente s'étendant de façon conique (32), caractérisée en ce que la partie de paroi (32) est munie d'un profil de réfraction selon la revendication 1, les arêtes réfringentes (33) et les rainures s'étendant à partir de la partie la plus étroite vers la partie la plus large de la partie de paroi transparente conique.

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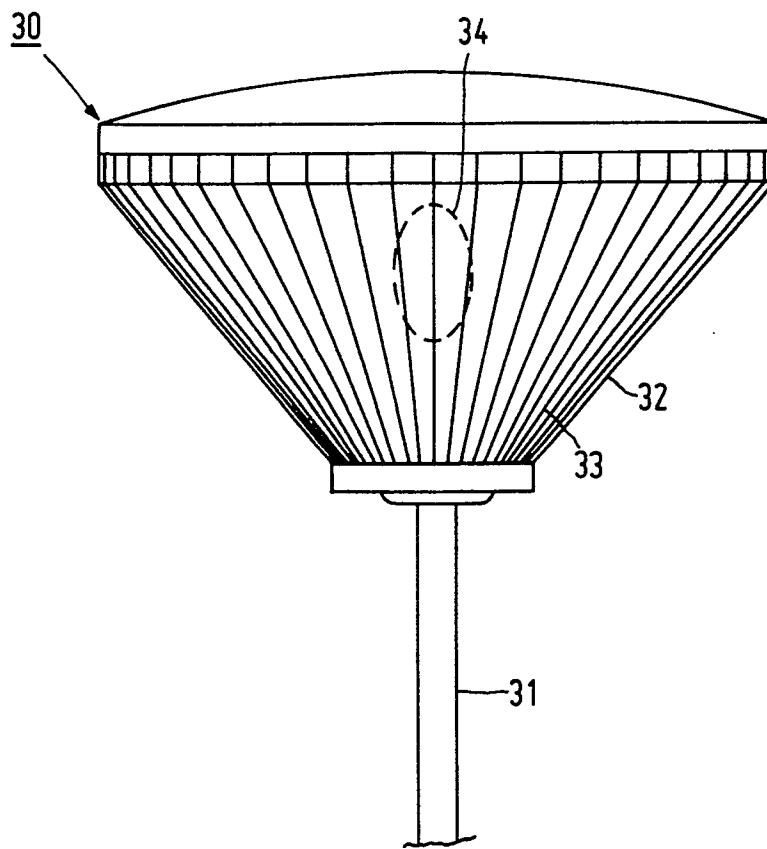


FIG. 4