350-437 SR

XR 3,633,022

[redacted]

TX4079E

United States

[11] **3,633,022**

[72] Inventor **Knut Otto S**
Idar-Oberst

[21] Appl. No. **882,997**
[22] Filed **Dec. 8, 1969**
[45] Patented **Jan. 4, 1972**

[54] **LAMP**
19 Claims, 19 Drawing Figs.

[52] U.S. Cl. **240/8.3,** 240/10.69, 240/41.3, 240/46.45, 240/106.1, 350/194
[51] Int. Cl. **B60q 1/30**
[50] Field of Search 240/8.3, 41, 41.3, 41.35, 46.45, 106.1, 7.1, 41.65, 10.69, 151; 350/194

[56] **References Cited**

UNITED STATES PATENTS

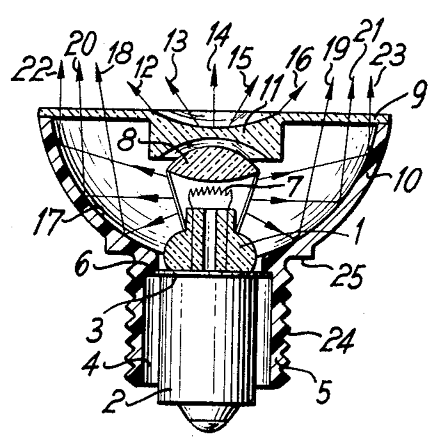
950,600	3/1910	Perry	240/41.3
1,143,316	6/1915	Poullain et al.	240/106.1 X
			240/106.1
			240/46.45
1,537,909	5/1925	Wolter	240/46.45
2,282,167	5/1942	Cullman	240/10.69

FOREIGN PATENTS

108,616	1/1968	Denmark	240/41.3
455,934	7/1968	Switzerland	240/41.3

Primary Examiner—Louis J. Capozi
Attorney—Michael S. Striker

ABSTRACT: A double-beam lamp, such as a taillight or warning light has a collective lens bulb in the axis of a surrounding reflector in whose focal space, the luminous wire of the lens bulb is located. The collective lens projects a first beam, and the reflector, whose shape deviates from a geometrical parabola, projects a second beam, and while one of the beams is made narrow and conical, the other beam is spread in horizontal direction by a cylindrical dispersing lens over a wide angle for lateral visibility while remaining narrow in the vertical direction to avoid loss of light.



PATENTED JAN 4 1972

3,633,022

FIG. 1

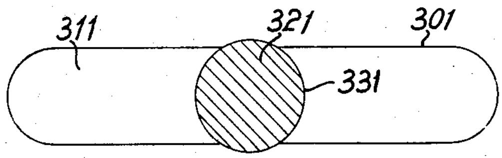


FIG. 2

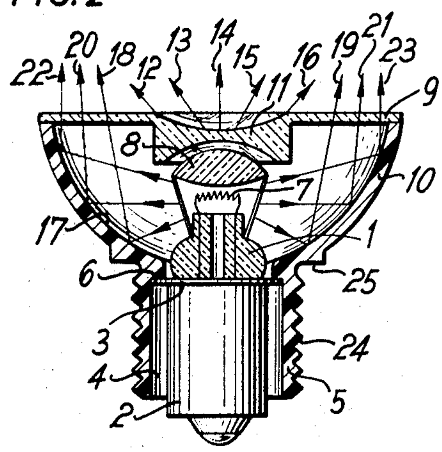
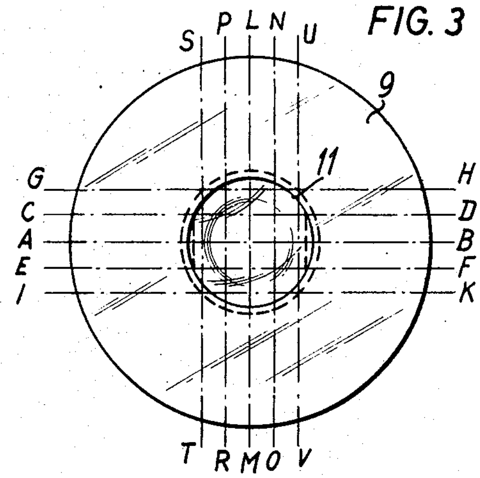


FIG. 3



INVENTOR
KNUT OTTO SASSMANNSHAUSEN

By: Michael S. Striker
Attorney

FIG.4

FIG. 5

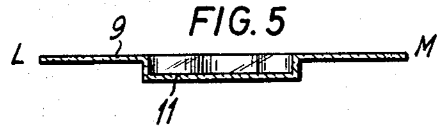


FIG. 6

FIG.7

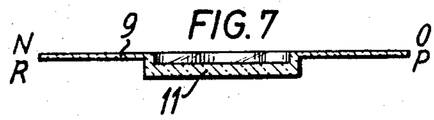


FIG.8

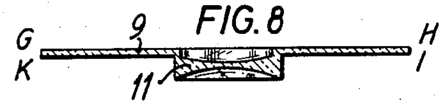


FIG.9

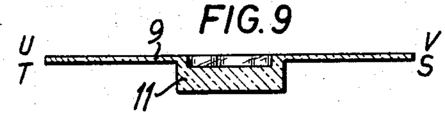
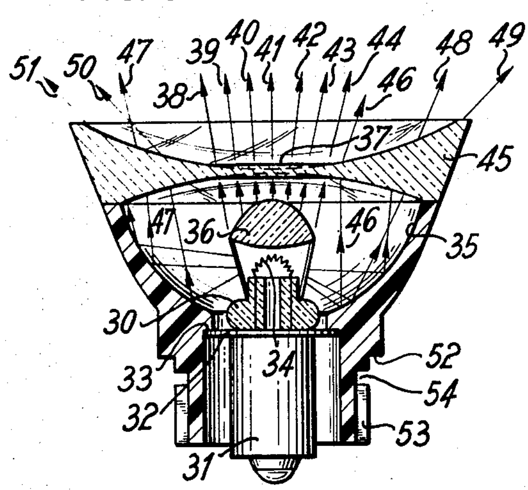


FIG.10



INVENTOR

KNUT OTTO SASSMANNSHAUSEN

By: Michael S. Striker
Attorney

FIG.11

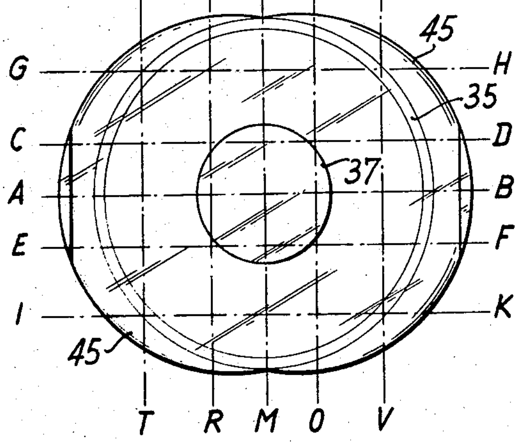


FIG.12

FIG.13

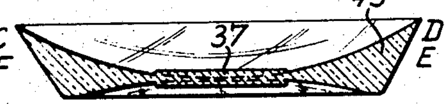


FIG.14

FIG.15

FIG.16

INVENTOR

KNUT OTTO SASSMANNSHAUSEN

By: [signature]
Attorney

FIG.17

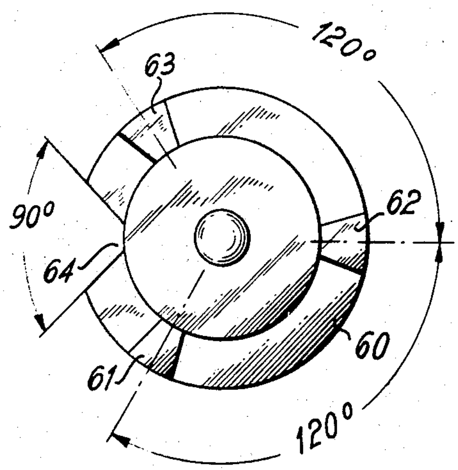


FIG.18

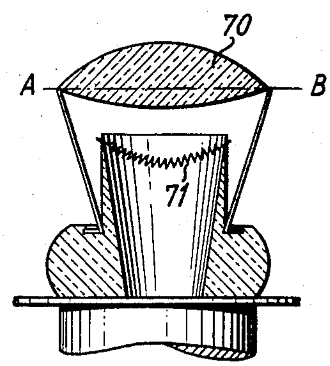
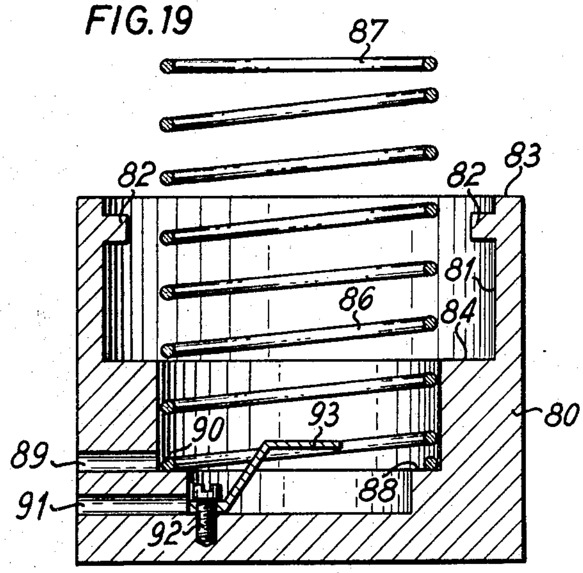


FIG.19



INVENTOR

KNUT OTTO SASSMANNSHAUSEN

By: Michael S. Striker
Attorney

LAMP

The invention concerns improvements in or relating to lamps with a light source and two optical collective systems, one of which is a concave reflector and the other a lens. It is particularly suitable for use as a rear or safety lamp, taillight or warning light. Such lamps are known and are advantageously used in torches and the like devices. They have the advantage of delivering a relatively high concentration of light with a limited supply of power.

In known lamps the requirement exists of projecting a maximum amount of light onto a limited surface in order to illuminate this surface well. There are, however, cases in which not the illumination of a surface but the visibility of the light source is important. This applies, for example, to bicycle rear lamps and to so-called warning flash lamps which are usually fed from batteries.

In many cases, particularly in rear and warning lamps, two light reflecting zones are necessary:

First a principal light beam is required, which is intended to cover an area of ±10° on either side of the horizontal and the vertical, in a direction opposite to the direction of travel. This corresponds to a light beam cone with an aperture angle of about 28°. It serves in rear and safety lamps to make the lamp visible to traffic coming from behind, in so far as such traffic follows approximately the main direction of traffic. This main beam has to meet the highest demands as regards its light intensity in order to make such a lamp visible over as long distances as possible.

On sharp curves or for traffic turning in from the side, this angle is indeed sufficient vertically but it is not sufficient horizontally. For this purpose a second light reflecting zone also of about ±10° is required on either side of the horizontal plane through the reflector axis, but about ±45° on either side of the vertical plane through the reflector axis opposed to the direction of travel. For a cone of light with a uniform aperture angle as in the first case, this would require an aperture angle of about 95°, whereupon all the light above and below 10° from the horizontal would be lost to the second light beam since it would be directed either to the road surface or, far above the following road users, into the air. A differently arranged second light beam has thus to be provided.

Accordingly it is an object of the invention to concentrate as great a proportion as possible of the light emitted from the light source, and to direct it into the two zones in which the light is required for the above purpose. The invention provides new means of achieving this purpose, with great optical efficiency and economy.

According to the invention there is provided a lamp, suitable for use as a rear or safety lamp comprising a light source and two optical collective systems, one of which is a concave reflector and the other is a lens, wherein the concave reflector is parabolic and has axial sections deviating by so much from the ideal shape of a parabola that it has a focal space instead of a focal point, the extent of which in the reflector axis is at least 3 percent and preferably 5 to 10 percent of the largest diameter of the reflector aperture, a lens bulb being so mounted with its lens coaxial with the concave reflector that at least a part of the luminous body of the lens bulb fills at least a part of the focal space as a result of which, in operation, a reflected conical light beam is formed whereas the luminous body of the lens bulb is so disposed between the lens and the inner focal point of the lens that a second conical light beam will be formed, an optical system serving to disperse light into two directions which extend oppositely in one plane, being disposed in front of only a part of the two optical collective systems, preferably of only one of the systems.

Theoretically parabolic reflectors have a focal point at which all parallel light beams incident on this reflector are combined. Practically, when using light which is incident strictly parallel on an optical bench, instead of a focal point an approximately spherical "focal space" will be present the maximum dimension of which is for example, about 1 percent of the extent of the reflector aperture. Within the scope of the present invention an attempt is made to increase the extent of this focal space to more than 3 percent, preferably to 5 to 10 percent of the maximum dimension of the aperture of the concave mirror this extension of the focal space need not necessarily be at right angles to the axis but it can also extend in the axis so that the focal space becomes linear.

The conical light beams spread out from the reflector and from the lens, and outside the reflector both a conical principal light beam with an aperture angle of about 28°, as well as a flat secondary light beam widened to e.g., about 90° are obtained. The two light beams preferably have approximately the same axis.

A slightly conically concentrated light beam emerging from the whole system is produced by the lamp according to the invention, which first beam is directed, for example, opposite to the direction of travel so that any vehicles which approach at high speed and can only turn aside with difficulty, are warned in good time. Additionally, however, a second light beam zone is produced on both sides for sharp turns or for traffic entering from the side; this light beam zone has approximately the same extension in the upward and downward directions as the first light beam, but laterally it is widely spread so that the merging traffic or the like, which can turn aside more readily than the traffic approaching in the direction of travel, has the possibility of avoiding the warning flash lamp, rear lamp or the like. Regulations for a rear lamp require at present that this lamp has to illuminate 10° in the upward and 10° in the downward directions in order to compensate for height differences in this way to a sufficient extent. In contrast an angle of 45° on either side of the direction of travel has proved itself for the broad beam emitter. The two light zones overlap. Since it is now always intended to obtain a light zone of ±10° for the conical light beam within a lateral area of **±10°**, an aperture angle of about 28° for the conical light beam results from the diagonal of the square thus determined.

It would be easy to carry out the limitation of the broad light beam in the upward and downward directions by masking; it is, however, desirable that this light above and below the angle of 10° should not be lost but that it be made likewise available to the broad beam. The various features of the object of the invention serve in particular for this purpose.

A converging light beam is produced by the lens in a simple manner in that the filament is arranged between the lens and the focal points of the lens. In a similar manner, a divergence of the light beam emitted by the concave reflector is caused by a displacement of the filament or of the whole lens bulb with respect to the concave reflector, but this has the disadvantage that the intensity of the light in the axis of the conical light beam is considerably reduced. It is therefore more advantageous to provide the reflector not with a defined "focal point" but with the above-described, mathematically less definite "focal space," the extent of which in the direction of the axis of the reflector is at least 3 percent, preferably 5 to 10 percent of the largest diameter of the reflector aperture. In front of these two optical collective systems which produce slightly diverging cones of light, there is to be disposed within the scope of the invention, an optical system which disperses light in two opposite directions extending, however in one plane, this system producing the broad beam. This dispersing system acts only on a part of the two optical collective systems so that a particularly bright principal beam is obtained; preferably it acts only on one of the two systems so that the other system is used exclusively for producing the brighter principal beam.

The dispersing system is preferably associated with the conventional cover plate of the concave reflector and advantageously forms a part thereof. Since such cover plates are generally pressed from a plastics material or from glass and in many cases have a special shape no special difficulties arise in making this cover plate of such a shape that it or a part thereof serves as a dispersing system. The dispersing system is conveniently a substantially cylindrical dispersing lens which is thinnest in the center (i.e., in a straight line perpendicular to the optical axis) and if desired, is plane-parallel and then increases in thickness on both sides of the centerline uniformly, preferably continuously.

The slight divergence which, according to the invention, should be effected by the concave reflector, can be obtained in that, e.g., a concave mirror which is parabolic in axial section, is resolved into several annular zones, each of which has its own focal point. A row of different focal points, i.e., a kind of a focal space is thus formed. If the annular zones are chosen as small as possible in their dimension extending parallel to the optical axis of the reflector, and smooth mergings between them are provided, as is quite possible in pressed plastics mirrors lined with metal, a "focal line" approximately coinciding with the optical axis is obtained, which is particularly advantageous for the present purpose because this line produces in the principal light beam (aperture angle about 28°) an extremely uniform distribution of light. Another possibility consists in that an imaginary paraboloid of revolution is associated with tangential mirror surfaces, preferably planes of an e.g., hexagonal shape. The small surfaces can contact the imaginary paraboloid of revolution at their centers. The size (in mm.^{2}) of the so arranged tangential surfaces should advantageously be determined by the equation $F=nQ/cp$ in order to obtain a sufficient focal space for the given aperture angle of the light beam: the distance n between the tangential point situated on the paraboloid of revolution and the focal point of the paraboloid measured in mm. is multiplied by the desired aperture angle Q in degrees; divided by cp, where c is a nondimensional constant and the value p is the angle in degrees, at which the luminous body appears in its maximum dimension as seen from the apex of the paraboloid c can readily be determined by trial and error for any type of construction. In both methods described in detail, at least a part of the luminous body must be arranged in the focal space. Any desired aperture angle for the light beam emitted by the reflector can thus be obtained while omitting the decrease of light intensity towards the axis, which is known in paraboloid mirrors with a defocused source of light.

The second optical collective system is the lens of the lens bulb.

A dispersing system acting only in the horizontal direction is disposed in front of only one part of the two light beams, as a result of which the flat conical light beam is formed, whereas the other as the principal light remains preserved, wholly or substantially unchanged.

Since as a rule it is possible to collect with the reflector a larger spatial angular zone of the light emitted by the luminous body than with the lens, the light emitted by the reflector will in many cases be used as the principal light beam and will not be dispersed in the horizontal direction. The light conveyed through the collective lens will be dispersed in this case. However, also the reverse way can be chosen if, e.g., a particularly large amount of light is required laterally.

If only one of the two light beams is used for dispersing light in the horizontal direction to an aperture angle of preferably at least 90°, an aperture angle of 20°, after passing through the collective system, would theoretically be sufficient for this light beam. With a dispersion in only the horizontal direction this results, however, in the intensity of light decreasing very considerably towards the upper and lower edges of the required horizontal angle, i.e., in the range of ±10°. This can be avoided very easily if one considers that the amount of light which with a uniform distribution of light passes through a cone with an aperture angle of, e.g., about 20°, is much greater in a range of, e.g., 0°–1° on either side of the centerline than in a range of 9°–10° on either side of the central line (assuming an approximately circular cross section of the original light beam). In order to keep these differences of the intensity of light as small as possible within the cone of light drawn apart to, e.g., 90° within the intended horizontal angle of originally +10°, the original angle of aperture of the cone of light, prior to dispersion, will be made greater than 20°, advantageously about 30°.

Another feature which is often even more advantageous in respect of the optical system consists in that the light beam collected by the lens emerges therefrom with a greater aperture angle in the horizontal direction than in the vertical direction. A ratio of the aperture angles of the light beam in the vertical and horizontal directions of 1:1.4, at least 1:3 already offers great optical technical advantages. The best ratio is between 1:1.5 and 1:2.5. In order to obtain this, a ratio of luminous body length to luminous body diameter of more than 10:1 can be chosen. The thus-dimensioned luminous body is then fitted between the focal point of the lens and the lens at right angles to the axis of the lens, i.e., if possible so that its central portion deviates from the connecting line between its initial portion and its end portion by at most 22 percent of the length of the luminous body. Beyond this it can be of great advantage not to shape the curvature of the luminous body as has hitherto been usual, i.e., the central portion of the luminous body closer to the lens than the end portions (luminous body curved towards the lens) but to shape it exactly in the opposite manner (luminous body is curved away from the lens). In this manner differences of the aperture angles of the light beam projected by the lens of 1:2 or even more can be achieved with the direction of measurement on the light beam being rotated through 90°.

The orientation of the longitudinal direction of the luminous body to the lamp should be determined precisely in that, e.g., both on the base of the bulb, as well as on the holder (socket or the like) of the lamp suitable means are provided. Particularly suitable for this purpose is, e.g., the standard prefocusing flange base P 13.5 *s* (miniature flange base) since its flange is not completely circular but has an opening into which a part of this holder of the lamp case engages so as to determine the angular position to the axis of the lens or of the hollow mirror.

In many cases it has become usual to shorten concave mirror reflectors on two opposite sides by means of surfaces parallel to the axis. If the luminous body is now placed in the axis of the system at right angles to these surfaces, a considerably larger amount of light is obtained from the reflector than in any other angular position of the axis of the body luminous body even in the absence of a collective lens and/or a dispersing system; and it is possible to use the auxiliary means of the preceding paragraph for the adjustment of the angular position of the axis of the luminous body.

In the accompanying drawings a diagrammatic illustration of the intended distribution of light is shown in FIG. **1**. Various advantageous embodiments of the invention are shown by way of example diagrammatically in the other Figures in which:

FIG. **2** shows an axial section, in which the reflector produces the principal light beam.

FIG. **3** shows the cover plate of FIG. **2** in plan view.

FIGS. **4, 5, 6, 7, 8, 9**, show alternative sections through the cover plate of FIG. **3**.

FIG. **10** shows in axial section a lamp, in which the lens of the lens bulb supplies the principal light beam.

FIG. **11** shows the cover plate of the lamp according to FIG. **10**.

FIGS. **12, 13, 14, 15, 16** show alternative sections through the cover plate of FIG. **11**. FIG. **17** shows the plan view of the flange of a prefocus stop base P 13.5 *s*.

Further, in FIG. **18** the upper portion of a lens bulb is constructed especially for producing an asymmetric beam is shown in an axial section.

FIG. **19** shows a closure cap for the reflector according to FIG. **10**. FIG. **1** shows the intended distribution of light which is obtained if the light from one of the lamps according to FIG. **2** or **10** is allowed to fall onto a surface which is disposed at some distance from this lamp and at right angles to its optical axis.

The portion **321** bounded by the line **331** is produced by the conical, axially symmetrical principal light beam, whereas the portion **311** bounded by the line **301** is produced by the broad light beam of the symmetrical dispersing lens. Measured in the vertical direction, both portions are about 30°. In the horizontal direction, the portion **321** has the same angle, whereas the portion **311** extends about 90° in the horizontal direction and is thus produced by a flat, broad beam. (The distortion of the circle **331** which results, e.g., from the length of the light body is not taken into consideration in the drawing).

According to FIG. **2** a lens bulb **1** is provided, which is provided with the standard prefocusing flange base or stop base **2** which is on the market under the name of P 13.5 *s*. The plate-shaped base flange **3** of this base after being inserted through the cylindrical recess **4** of the reflector projection **5**, engages the stop surface **6** of the reflector and thus ensures a precisely predeterminable position of the incandescent coil or luminous body **7** of the bulb **1** relative to the reflector **10**. This body **7** has a ratio of diameter to length of the incandescent portion which glows in operation of about 1:20. It is only very slightly curved, i.e., its central portion deviates from the connecting line of its two end portions by only about 5 percent of the whole length of the body. It is thus achieved that the collective lens **8** of the lens bulb **1** produces an asymmetrical light beam which in the direction of the longitudinal extension of the luminous body has an aperture angle of about 50° and at right angles thereto an aperture angle of about 30°. In order correctly to secure the angular position of the wider aperture angle of 50° with respect to the optical axis, means are provided which are more fully explained later in connection with FIG. **17**.

The reflector **10** consists for example of plastic material and is axially symmetrical. The aperture of the reflector **10** is masked by a cover plate **9** which in its part disposed in front of the collective lens **8** of the lens bulb **1** has a dispersing lens **11**, the shape of which will be explained more fully with reference to the following Figures. Since this lens is intended to disperse to the right and left and not axially symmetrically (but laterally symmetrically), it is a double concave cylindrical lens having an approximately double-grooved shape. Theoretically this "dispersing lens" could extend from one reflector edge to the other and thus also disperse a part of the light beam produced by the reflector **10**. It has, however, proved to be advantageous to limit the dispersion to one of the two light beams, here the light beam of the collective lens **8** because the optical results can thus be predetermined more exactly. The light rays collected by the collective lens **8** of the lens bulb in a slightly divergent light beam, are spread apart here by the dispersing lens **11** in the horizontal direction to slightly over 90°, as a result of which a flat, conical light beam is formed. The directions of some rays of this light beam are represented by the arrows **12,13,14,15,16**.

Turning now from FIG. **2** to FIG. **1**, the boundary designated by **301** of the luminous surface **311** is obtained.

The reflector **10** of FIG. **2** has on its inner side a reflecting coating **17**. It consists advantageously of various annular zones with different focal points succeeding one another for example, in the axial direction. The transitions between the individual zones are advantageously smooth so that a focal line extending in the axial direction is formed. The focal point of the annular reflector zone (in the lower part of the drawing) nearest (axially near) to the bulb **1** is relatively far removed from the luminous body **7**. The succeeding zones have foci which progressively approach the position of the luminous body **7**. In the vicinity of the cover plate **9**, an annular reflector zone is provided, through the focal point of which the luminous body **7** of the lens bulb **1** passes. The effect of this arrangement is apparent from the light rays **18,19,20,21,22,23**. Those rays (**18,19**) which originate from zones, the focal points of which are farthest removed from the luminous body, enclose an aperture angle of about 30°. This aperture angle decreases through about 15° to approximately zero. In addition to the smooth transitions between the individual annular reflector zones with different focal points, also the finite dimension of the luminous body **7** (in contrast to a point luminous body) ensures that the thus produced light beam will be homogeneous. As can be seen in FIG. **2**, the edge portion of the cover plate **9**, through which the reflected light rays pass, is plane-parallel and thus does not influence their direction. The above-mentioned rays **18** to **23** produce in FIG. **1** the light spot **321** with the boundary **331** which spot **321** advantageously projects upwardly and downwardly slightly beyond the flat beam **301,311**.

Since the lamps according to the invention are frequently exposed to bad weather, it is advantageous to seal them in a weather resisting manner. For this purpose the reflector boss **5** has an outer thread **24**, onto which an advantageously totally closed cap (see FIG. **19**) with an internal thread is screwed. An annular sealing member, e.g., of rubber, can then be placed in front of an annular stop member **25**. Moreover the cover plate **9** is tightly cemented on or welded on. Upon screwing the cap onto the reflector **10**, this reflector together with its lens bulb **1** will then be sealed in a completely watertight manner.

Instead of the above-mentioned reflecting annular zones, also a plurality of tangentially arranged surfaces or planes can be used.

FIG. **3** shows the plan view of the cover plate **9** of FIG. **2**. Its outer annular portion is plane-parallel and its central portion is formed by the dispersing biconcave lens **11** with a circular boundary line. For better understanding of this cover plate **9**, various sectional views have been taken through it along section lines designated by the letters A–B, C–D, E–F, G–H, I–K, L–M, N–O, P–R, U–V and S–T.

FIGS. **4** to **9** show these sections.

FIG. **4** shows the radial section through the cover plate **9** on the line A–B. The plane-parallel edge and the double concave dispersing portion can be seen.

FIG. **5** shows the radial section L–M which is at right angles to that of FIG. **4**. It can be seen that also here the dispersing lens or groove is plane-parallel in section. If one follows the section line L–M in FIG. **3** it will be noted that in the central portion the dispersing lens is approximately plane-parallel and becomes thicker from there towards either side, in the present case towards the right as well as to the left, and on either face, i.e., becomes double concave.

In FIG. **6** laterally offset sections C–D and F–E are shown, which extend parallel to A–B. The section through the lens portion has become shorter.

FIG. **7** shows sections N–O and R–P parallel to L–M, and also here the plane-parallel appearance of the sectional plane can be recognized; at these places, however, the lens is already much thicker than in FIG. **5**.

FIG. **8** shows sections G–H and K–I which extend parallel to A–B but are even further out from the center so that the section through the lens portion has become even shorter.

Finally in FIG. **9** shows the sectional plane which is formed by sections on lines U–V and I–S. The sectional plane of the lens or groove bounded by parallel lines, has here already attained almost its final thickness.

FIG. **10** shows another embodiment according to the invention A lens bulb **30** is supported by a prefocusing flange base or stop base P 13.5 *s*. The flange **32** of the base **31** engages the stop face **33** of the reflector **35**. The luminous body **34** is thus brought into a precise position inside the reflector. In this case the luminous body of the lens bulb **30** is strongly curved in order to be able to produce a uniformly round light beam through the double convex collective lens **36** of the bulb. The angular position of the axis of the lens bulb **30** need not be determined specifically in this case since the collective lens **36** supplied a uniformly round, conical light beam which will no longer be dispersed. The cover plate **45** has a central portion **37** which is made plane-parallel, and through which the light rays **38, 39, 40, 41, 42, 43, 44**, concentrated by the collective lens **36**, and forming the main beam pass undisturbed. Only in the edge regions through which the light rays collected by the reflector **35** pass, is there a double-concave, gutter-shaped dispersing lens **45**, the boundaries of which in the region of the intersected central portion **37** are indicated by broken lines. The concave mirror reflector **35** having the shape of a paraboloid of revolution is in this case resolved into a plurality of small surfaces. At the point at which such a surface tangentially follows the ideal shape of a paraboloid of revolution, the light rays are directed parallel. This can be seen in rays **46** and **47** which extend parallel before they research the double-concave dispersing lens **45** and are reflected in two opposite directions by this lens. In contrast the light rays which fall on such a reflector surface outside the tangential point, do not extend parallel but have different angles of divergence of up to about 30° in front of the dispersing lens. They are then additionally refracted further in two opposite directions by the dispersing lens **45**. This can be seen from rays **48, 49, 50, 51**. The lamp shown in FIG. **10** can also be provided with a reflector of the type shown in FIG. **2**, and conversely. Also in the lamp shown in FIG. **10**, it is advantageous to seal all the connecting points in a watertight manner. For this reason the reflector projection has likewise a stop shoulder **52** surrounding it, in front of which a sealing ring can be placed. The lamp can then be sealed watertight with a cap (cf. FIG. **19**) which can have a bayonet joint in the form of two projecting pins. These pins are inserted into the guide grooves **53** and then secured by rotation in the guide groove **54** which extends a short distance around the axis. It is particularly advantageous to provide this cap with the current supply terminals for the bulb, as shown by way of example in FIG. **19**.

FIG. **11** shows a plan view of the cover plate **45** of the lamp according to FIG. **10**. In the following FIGS. **12, 13, 14, 15, 16** the sectional planes are shown, which are formed by sections on lines C–D, E–F, G–H, I–K, L–M, N–O, P–R, U–V, S–T in FIG. **11**. The section A–B corresponds to the section according to FIG. **10**. The section L–M extending at right angles thereto is shown in FIG. **12**. It can be seen that the cover plate **45** has in the center the same thickness as at **37** in FIG. **10**; however, the cover plate is much thinner at the edge since the lowermost line of the gutter-shaped "dispersing means" extends herethrough. Starting from this lowermost line the wall thicknesses increase on either side, as can be seen from the section C–D/F–E (and FIG. **10**). Only a central, short, plane-parallel portion is still present there, and the remainder is formed by the "dispersing gutter-shaped lens, the "gutter direction" of which is to be imagined in this case at right angles to the plane of the drawing of FIG. **13** (and FIG. **10**). The section G–H/K–I of FIG. **15** is even further out and no longer shows a plane-parallel portion in the center.

The sections N–O and R–P (FIG. **14**) which are parallel to L–M, are still in the vicinity of the lowermost line of the "-groove" so that the central portion **37** appears somewhat thickened, but as compared to FIG. **12** the thickness of the edge is already increased. In the last two sections of FIG. **16** (U–V/T–), the central portion is no longer cut, and the parallel upper and lower boundary lines of the dispersing lens are shown.

FIG. **17** shows a plan view of a commercial prefocusing stop base P 13.5 *s*. The peripheral base flange with its three points of support **61, 62, 63** can be seen. In addition the gap **64** of 90° in this base flange, provided for the present invention, particularly for use according to FIG. **2**, can be seen. The axial position of the lens bulb can be fixed by means of this gap if a projecting portion is provided on the associated stop face **6** of the reflector boss as has already been described in the introduction.

FIG. **18** shows the upper part of a lens bulb. The largest diameter of the collective lens **70** is indicated at A–B. The luminous body **71** is so mounted perpendicularly to the optical axis of the lens bulb that its central portion is further from line A–B than its end portions. Particularly large differences in the aperture angle of the light beam projected by the collective lens **70** can thus be obtained, dependent upon whether this aperture angle is measured in the direction of the luminous body **71** or at right angles thereto. Such a lamp is particularly suitable for a light according to FIG. **2**.

FIG. **19** shows a closure cap **80** for, e.g., the reflector **35** in FIG. **10**. The internal diameter of this closure cap **80** is, at **81**, as large as the outer diameter of the reflector boss of FIG. **10**. The bayonet pins **82** are introduced through the guide grooves **53** and rotated into engagement in the peripheral groove **54**. At the same time a sealing ring is compressed between the edge **83** of the closure cap **80** and the peripheral stop **52** of the reflector **35**, in order to make the unit watertight. At **84** the internal diameter of the closure cap is reduced so that at **85** it has a value which corresponds to the outer diameter of the compression spring **86** and thus guides and aligns this spring in the axial direction. The end **87** of the compression spring **86** is intended to press the lens bulb **30** of FIG. **10** with its base flange **32** against the stop **33** of the reflector **35** and thus ensure a secure seating of the lens bulb. If the stop **33** of the reflector **35**, as already proposed in the introduction has a projection which engages in the gap **64** of the base flange **60** in FIG. **17**, the spring **86**, due to its pressure on the base flange, secures the lens bulb against being lifted off the stop **33** and thus against rotation about the axis of the system. At the same time the spring **86**, the end of which facing the cap is supported on the peripheral stop **88** of the closure cap **80**, can also serve as one of the electric current conductors. For this purpose a current supply wire can be introduced through the hole **89** of the closure cap **80** and be connected, e.g., soldered at **90** to the compression spring **86**. The hole **89** should preferably be slightly narrower than the insulation of the current supply cable so that the unit is sealed watertight. The same applies to the hole **91**, through which the second current supply wire is introduced, which by means of the screw **92** is conductively connected with the small contact plate **93** which is intended to press on the bottom contact of the bulb **30** in FIG. **10**. In the assembly, care should preferably be taken that the holes **89** and **91**, through which the current leads enter, point downwardly so that moisture can run off downwardly. For this purpose it is advantageous that the bayonet pins **82** and consequently also the guide grooves **53** in FIG. **10** are offset with respect to one another not by precisely 180° but by a larger or smaller angle so that the position of the closure cap **80** on the base can safely be predetermined with respect to the direction of the holes **89** and **91** since otherwise the closure cap can not be placed onto the reflector. The example shown here is only one of many possible examples; also, e.g., in front of the stop **33** in FIG. **10** a metal ring could be placed and the current supply wire thereto could be introduced through a hole in the reflector boss. It is also advantageous that the reflector should further have above the sealing edge **52** a protective cover projecting above the sealing position by means of which rain water is drained off above the seal. It is, however, common to all examples that the reflector itself is sealed watertight by means of the closure cap and an additional e.g., casing can thus be omitted. This can be used particularly well with plastics reflectors. This tight construction can be used for all reflectors, thus, e.g., also for headlights without a collective or dispersing lens.

All the lens bulbs shown here are provided with a frame support because the precision of the lamp can be achieved most easily therewith. In so far as the necessary precision in the position of the filament can also be obtained by other means, also bulbs without a support can, however, be used.

What I claim is:

1. Double-beam lamp, particularly for use as taillight or warning light, comprising a collective lens, and a luminous body located in the axis of said lens between the same and a focal point of the same so that a first conical beam of light is projected by said lens; a concave substantially paraboloid reflector surrounding said lens and said luminous body and having an axis coinciding with said axis, sections of said reflector deviating from a parabola having an exactly geometrical shape so that said reflector has a focal space extending along said optical axis a distance between 3 percent and 10 percent of the diameter of the open end of said reflector; said luminous body being at least partly located in at least a part of said focal space of said reflector so that a second conical beam of light surrounding said first conical beam is projected by said

reflector toward said open end of said reflector; and an optical dispersing system located at said open end for dispersing at least one of said conical beams only in one direction a wide angle so that an oblong area extending in said one direction is illuminated by said dispersed beam, while a substantially circular area at least partly coinciding with the central portion of said oblong area is illuminated by the other beam.

2. Double-beam lamp as claimed in claim 1 wherein said optical dispersing system includes a transparent cover plate for closing said open end of said reflector and including a central portion aligned with said collective lens and passed by said first beam, and an annular portion passed by said second beam; and wherein one of said portions is a substantially cylindrical lens.

3. Double-beam lamp as claimed in claim 1 wherein said dispersing system includes a substantially cylindrical dispersing lens which is thinnest along a centerline transverse to said optical axis and to said one direction, and uniformly increases in thickness in said one direction toward either side of said centerline.

4. Double-beam lamp as claimed in claim 3 wherein said substantially cylindrical dispersing lens is located in front of only said collective lens aligned with the same so that said first beam passes through said dispersing lens and is spread in said one direction.

5. Double-beam lamp as claimed in claim 3 wherein said substantially cylindrical dispersing lens is located in front of said open end of said reflector so that said second beam passes through said dispersing lens and is spread in said one direction.

6. Double-beam lamp as claimed in claim 1 wherein said dispersing system includes a biconcave lens.

7. Double-beam lamp as claimed in claim 1 wherein said concave reflector is composed of a plurality of annular paraboloid reflecting zones having different focal points spaced along said optical axis.

8. Double-beam lamp as claimed in claim 7 wherein the transitions between said reflecting zones and the paraboloid shape of the same are selected so that said focal points form a focal line extending along said optical axis.

9. Double-beam lamp as claimed in claim 1 wherein said reflector is composed of a plurality of annular planar reflecting surfaces connected to each other so that said planar reflecting surfaces together approximate a paraboloid.

10. Double-beam lamp as claimed in claim 9 wherein said planar reflecting surfaces extend tangentially to a paraboloid.

11. Double-beam lamp as claimed in claim 1 wherein said first conical beam has in a plane extending through the optical axis of said collective lens and in the longitudinal direction of said luminous body, which is disposed at right angles of said axis, an aperture angle at least 1.3 times greater than the corresponding angle of aperture at right angles to the longitudinal direction of said luminous body; wherein said collective lens and said luminous body are combined in a bulb; and comprising a holder for said bulb fixing the angular position of the axis of said bulb and of said luminous body.

12. A lamp as claimed in claim 11 in which the aperture angle of the conical light beam to be produced by said collective lens of the bulb in the plane extending through the optical axis and the longitudinal direction of said luminous body, is 1.5 to 2.5 times larger than the corresponding aperture angle at right angles to the longitudinal direction of said luminous body.

13. A lamp as claimed in claim 11, in which the luminous body of the lens bulb has a ratio of length to external diameter of more than 10:1, and its central portion deviates from the line connecting the end portions of the section which glows in operation by at most 22 percent of its length, its longitudinal direction being arranged approximately at right angles to the optical axis of the lens bulb.

14. A lamp as claimed in claim 11 in which said luminous body is arranged approximately at right angles at the optical axis of the lens bulb.

15. A lamp as claimed in claim 14 wherein said luminous body has at its central portion a smaller spacing from a plane extending through the largest diameter of said collective lens than at its end portions.

16. A lamp as claimed in claim 11 in which said lens bulb is provided with a prefocusing miniature base flange, and in which the angular position of the axis of said bulb is fixed by a projection of said holder engaging a recess in a base flange.

17. A lamp as claimed in claim 1 wherein said reflector has at least one peripheral sealing surface, and comprising a closure cap having a sealing surface in sealing contact with said peripheral sealing surface of said reflector.

18. A double-beam lamp as claimed in claim 1 wherein said dispersing system includes a substantially cylindrical dispersing lens which is thinnest and plane parallel in a circular central portion axially aligned with said collective lens and uniformly increases in thickness in said one direction toward opposite sides of said dispersing lens; wherein said collective lens projects said first conical beam through said thin plane-parallel center portion; and wherein said second conical beam passes through the outer annular portion of said cylindrical dispersing lens and is dispersed by the same in said one direction.

19. A double-beam lamp as claimed in claim 1 wherein said dispersing system includes a transparent plane-parallel plate having a center portion which is a substantially cylindrical lens aligned with said collective lens along said optical axis and uniformly increasing in thickness in said one direction toward opposite sides of said cylindrical lens; wherein said collective lens projects said first beam through said cylindrical lens; wherein said second conical beam passes through said plane-parallel plate; and wherein said first beam is dispersed by said cylindrical lens in said one direction.

* * * * *