Dec. 12, 1939. F. L. G. SCHNEIDER 2,183,048

LAMP CONSTRUCTION COMPRISING A REFLECTOR

Filed Dec. 13, 1938 2 Sheets-Sheet 1

Fig. 1.

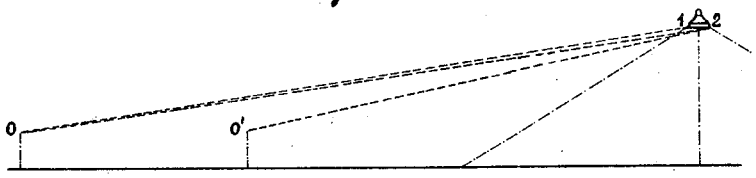


Fig. 2.

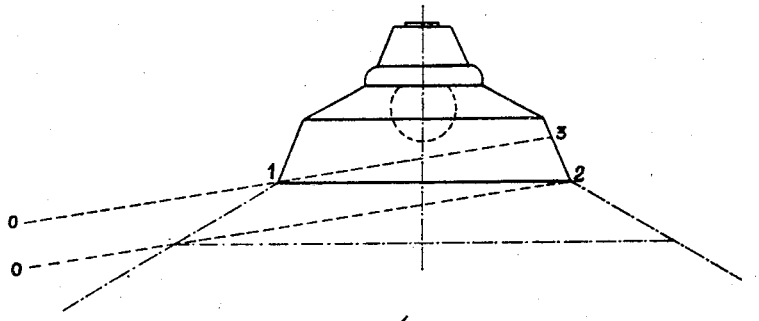
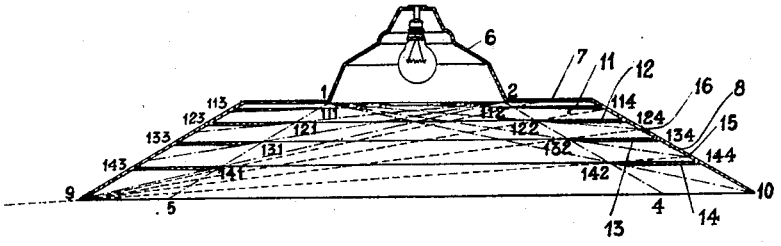


Fig. 3.



INVENTOR
F. L. G. SCHNEIDER
BY Josef Oppenheimer
ATTORNEY

Dec. 12, 1939. F. L. G. SCHNEIDER 2,183,048

LAMP CONSTRUCTION COMPRISING A REFLECTOR

Filed Dec. 13, 1938 2 Sheets-Sheet 2

Fig. 4.

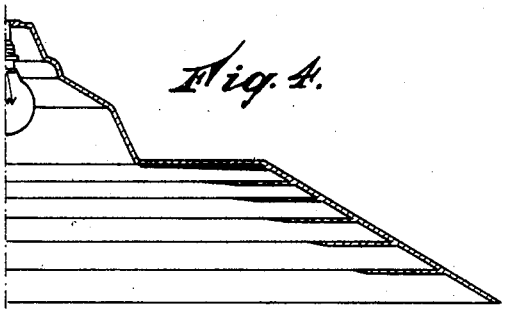


Fig. 5.

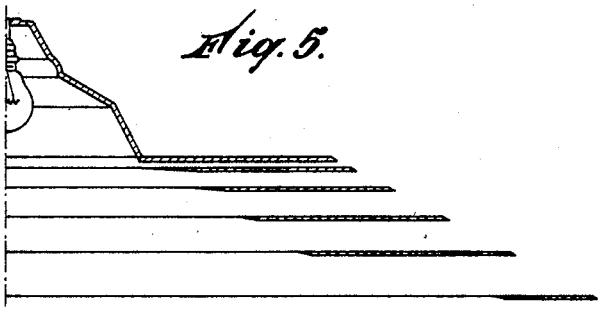


Fig. 6.

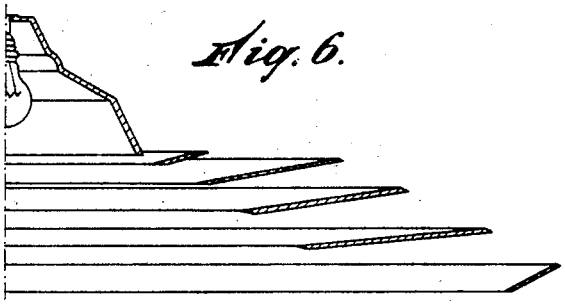
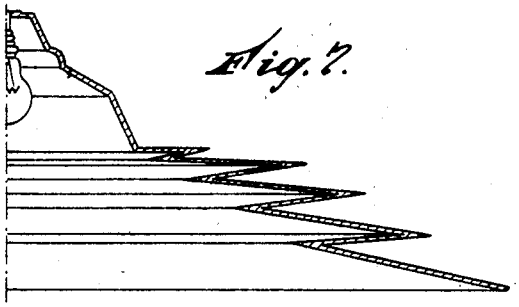


Fig. 7.



INVENTOR
F. L. G. SCHNEIDER
BY Josef Oppenheimer
ATTORNEY

Patented Dec. 12, 1939

2,183,048

UNITED STATES PATENT OFFICE

2,183,048

LAMP CONSTRUCTION COMPRISING A REFLECTOR

Frans Lambert Gerard Schneider, The Hague, Netherlands, assignor to Holland Electro N. V., Rotterdam, Netherlands, a corporation of the Netherlands

Application December 13, 1938, Serial No. 245,379
In the Netherlands January 28, 1937

5 Claims. (Cl. 240—103)

The invention relates to a lamp comprising a reflector.

With the existing devices of this kind for lighting streets, locks, canals, railway stations and the like a portion of the lamp which is directly illuminated by the source of light will still be visible, theoretically speaking at an infinite and practically speaking at a very great distance.

With lighted road, for example, where lamp posts are generally placed at approximately uniform distances, a person travelling along such a road will see a portion of the illuminated inner surfaces of the said lamps projected in the shape of oval, rectangular, or otherwise shaped discs, depending on the form of the devices.

Since the lighting of these portions is very intensive on account of their close proximity to the source of light, the attention of the travellers along such roads is turned away from the less brightly lighted objects on the said road. Moreover the projections will produce a more or less troublesome blinding effect on the observer. This evil is even more strongly felt in the case of lighted railway platforms where the signal lights arranged between those lighting devices are often only faintly perceptible.

In general, however, an object even if it is less brightly lighted will be plainly visible, as long as the eye is not struck directly by rays of light.

The object of the present invention is to produce a lamp structure for the above purposes in which the portions of the lamp which are illumined by the source of light—during the time that the observer remains outside the cone of light rays formed by the lamp—will be invisible or practically invisible to the observer either from all sides or from some sides, so that the blinding effect will be eliminated.

According to the invention the drawback mentioned above is overcome by providing below the lower edge of the reflector and outside the cone proper of the projected light beam, screens of the type of Venetian blinds positioned horizontally or more or less inclined in such a way that for an observer remaining at a distance outside the cone of the light beam the top portion of the screens is invisible. In this manner a person will only observe the underside of the screens which practically is not illuminated, whereas the screens facing the observer will shield the reflector opening. Consequently practically no directly lighted surface will be visible to the observer's eye.

If the screens are placed horizontally they may be so wide that they will screen off practically all of the illuminated inner surface of the reflector which is turned towards the observer, so that only at a very great distance a small portion thereof will be visible between the screens.

The width of the screens may, however, be greatly reduced by surrounding the screens at the outer side by a wall which forms a continuation of the reflector casing. This wall partially provides the screening and prevents a portion of the inner wall from being visible between the screens, without unduly increasing the dimensions of the lamp structure. At the same time the screens are connected with each other and with the reflector casing in a very simple manner.

It is also possible to produce complete screening without the aid of such casing by arranging the screens in a more or less inclined position in such a way that for an observer remaining at some distance outside the cone of the projected light beam the reflector opening is quite invisible.

Another embodiment of the invention is still possible in which each screen is formed by two walls situated one above the other, the edges of the walls being connected with each other at the inner side of the lamp structure, whereas starting from that connected edge, the lower wall is inclined downwardly and the upper one is inclined upwardly and connected with the outer edge of the lower wall of the screen located thereabove.

The invention is further explained by the accompanying drawings in which different embodiments are illustrated by way of example and in which:

Fig. 1 is a schematical view of a known road lighting system.

Fig. 2 is a lighting device belonging to the road lighting system according to Fig. 1, on an enlarged scale.

Fig. 3 is a section through one half of a lamp construction according to the invention.

Fig. 4 is a section through one half of a second embodiment of a lamp construction.

Fig. 5 is a section through one half of a third embodiment of a lamp construction.

Fig. 6 is a section through one half of a fourth embodiment of a lamp construction.

Fig. 7 is a section through one half of a fifth embodiment of a lamp construction.

In the road lighting system according to Fig. 1 it is assumed that the eye 0 of the observer is positioned at a distance of 30 metres from the

lamp which is suspended at a height of 6 metres above the surface of the road. The distance of the observer's eye from the surface of the road is supposed to be 1.60 metres, the light radiating angle of the lamp structure being supposed to amount to $2\times60°=120°$. The cone of light striking the surface of the road, since the opening 1—2 of the lamp is supposed to be circular has a base of a radius of 6 tan 60°=approx. 10.4 metres.

The observer therefore at this distance will be far outside the cone of light, but nevertheless he will see the lamp very clearly, because of the fact that the pencil of light rays located between the rays 0—1 and 0—2 will reach his eye and will cause him to see clearly the projection of the plane 1—2 of the lamp structure shown on an enlarged scale in Fig. 2, which projection will be the surface 2—3 having the shape of an ellipse with the axes 1—2 and 2—3. It may be considered to be known that the lighted surface will produce on the observer the blinding effect described above.

In order to render the planes 1—2 or 2—3 respectively invisible to the observer, it would be necessary to arrange about the entire lamp structure a screen 1—2—4—5, Fig. 3, whereby the interior surface would be screened off for an observer whose eye is situated at the point 0'. The interior surface of the screen should then be light-absorbent, so that it cannot emit any light towards the observer, since otherwise the observer would still see the projection of plane 4—5. With the means now available this object cannot be realized, since up to the present there are no materials for making the surface 1—2—4—5 so as to even approximately meet the above requirements.

The object of the present invention is to absorb the rays of light striking the imaginary plane 1—2—4—5 illustrated in Fig. 3, for example by intercepting them in such a way that they do not reach the observer.

A construction by means of which this is obtained according to the invention is illustrated in Fig. 3 taking as a starting point the case illustrated in Fig. 1, with this difference that the observer who has advanced until he is at a distance of 20 metres from the axis of the lamp, will be unable to see the plane 1—2, and only when further approaching the axis of the lighting device will begin to see the surface 1—2 in part. To this effect, it is necessary that all rays of light striking the surface of the cone 1—2—4—5 are absorbed so that they cannot reach the observer who advanced to a distance of 20 metres.

The lamp construction which is planned in the shape of a solid of revolution consists of a casing 6 either provided at its inner side with a reflector, or having an interior wall which is more or less light-reflecting, the opening of the casing being denoted by the reference numerals 1—2, as in Figs. 1 and 2. At the lower edge of the reflector case is provided a shield or screen forming a continuation of the casing and consisting of a horizontal annular portion 7 and a conical portion 8 having an opening 9—10. On the inside of wall 8 horizontal annular screens 11, 12, 13 and 14 are arranged in the manner of Venetian blinds, the internal diameters of which are denoted by 111—112, 121—122, 131—132 and 141—142, while the external diameters are denoted by 113—114, 123—124, 133—134 and 143—144. The internal diameters, 111—112, 121—122, 131—132 and 141—142 coincide with the circumference of the cone of light rays 5—1—2—4. The screens are located outside the cone of light and consequently do not obstruct the free radiation of the lamp.

The number of screens 11, 12, 13 and 14 in the embodiment illustrated is reduced to a minimum, but this number may also be greater. All rays of light emitted outside the cone of light rays proper, and which intersect the plane 5—1—2—4, will either strike the upper side of the screens 11, 12, 13 and 14 or the interior wall of the screen 8, but this will occur at places which are not visible to the observer as they are shielded by the screens 11, 12, 13 or 14.

The mutual distance of the screens must be chosen with a view to the said considerations.

In the example illustrated in Fig. 3 the place where the lowermost screen is to be located may be found by determining the intersection point of line 9—2 (the direction of which is to correspond to the light ray 0'—2 in Fig. 1 in which the observer is supposed to have advanced to a distance of 20 metres) with line 1—5, that is to say with the cone surface 5—1—2—4. In this point the lowermost screen 14 has been arranged, thus preventing the observer from seeing the surface 1—2. On account of screen 14 the portion of screen 8 located below screen 14 may be deleted. When drawing a line through the points 9 and 142 intersecting the inner surface of the screen 8 at the point 15, it will be clear that the small cone surface with the generatrix 15—144, even when it is lighted, will remain invisible to the observer.

If now the point 15 is connected with the point 1, the point of intersection 132 with the line 2—4 will determine the place where another screen is to be provided. If the point 9 is then connected with the point 132, it will be found that the small cone surface 16—134 is invisible. Continuing in this manner the screens which are indispensable will be determined while it will be appreciated that the cone surfaces having the generatrices 134—15, 124—16, etc. which are located in the shadow of the adjoining screen will not be lighted and consequently will be invisible.

In this manner all the rays of light intersecting the cone surface 5—1—2—4 will be absorbed so that the said surface as a whole is invisible for the observer.

It is evident that the internal diameters of the screens 11, 12, 13, 14 need not coincide with the circumference of the cone of light. It is only required that these interior diameters are located outside the cone of light, that the upper sides of the screens are not visible to the observer and that in the embodiment described above the lighted portions of the screen 8 are also shielded by the screens 11, 12, 13 and 14.

An embodiment in which the interior edges of the screens are located outside the cone of light is illustrated in Fig. 4, which embodiment otherwise is similar to that of Fig. 3.

Fig. 5 represents an embodiment of a lamp construction in which screen 8 has been omitted and screens 11, 12, 13, 14 are so wide that only a very small portion of the reflector opening 1—2 will be visible between them for a person positioned at a very great distance from the lamp, which in actual practice is more than sufficient.

Even this possibility may be obviated by arranging the screens 11, 12, 13 and 14 in a more or less inclined position, as indicated in Fig. 6. In this embodiment as in the embodiments according to Figs. 4 and 5 described above, the

interior circumferences of screens 11, 12, 13 and 14 are determined as described for the construction according to Fig. 3. It is evident from Fig. 6 that the reflector opening will be invisible at any distance outside a cone of light the generatrix of which is indicated by 2—141—9 or by 1—142—10.

Fig. 7 represents another embodiment in which the screens 11, 12, 13 and 14 are formed by V-shaped walls, which construction may be obtained by providing in an embodiment according to Fig. 6 a wall between each inner edge of one of the screens 11, 12, 13 and 14 and the outer edge of a screen located thereabove. In this manner a very well connected whole is obtained.

With the embodiments omitting screen 8 according to Figs. 5 and 6 the screens 11, 12, 13 and 14 may be connected with each other in any manner desired.

It is still to be observed that the screens 7, 8, 11, 12, 13 and 14 need not surround the entire circumference of the lamp construction.

By way of example, it is possible to omit the screens completely or partially at those sides where the radiation of the light will not cause trouble or is even expressly desired, as for instance when a road is lighted at one side or at both sides. The same will contingently be true for the reflector.

In general the efficacy of the lamp will be increased by giving a suitable color to the entire construction, whereby moreover the danger of illumination by means of the reflection caused by objects which may be present in the vicinity of the lamp, will be reduced.

It is furthermore to be borne in mind that the construction according to the invention may also be applied to existing lamps.

I claim:

1. As a new article of manufacture, a flood light comprising, in combination, a reflector for projecting a diverging light beam of predetermined shape, said reflector also projecting undesired stray light, a plurality of substantially plane opaque screens having openings of geometrical configuration similar to the reflecting area of said reflector, said screens spacedly arranged from each other and said reflector and in front of and in alignment with the latter, the areas of the openings of said screens exceeding said reflecting area and increasing about proportional to the square of their distance from said reflector so as to closely embrace said projected diverging light beam and to intercept undesired stray light projected by said reflector.

2. As a new article of manufacture, a flood light comprising, in combination, a reflector for projecting a diverging light beam of predetermined shape, said reflector also projecting undesired stray light, a plurality of substantially plane opaque screens having openings of geometrical configuration similar to the reflecting area of said reflector, said screens spacedly arranged from each other and said reflector and in front of and in alignment with the latter, the areas of the openings of said screens exceeding said reflecting area and increasing about proportional to the square of their distance from said reflector, said screens extending substantially vertically to the main direction of said beam so as to intercept stray light which would otherwise strike an observer within a predetermined distance outside said shaped beam.

3. As a new article of manufacture, a flood light comprising, in combination, a substantially circular reflector for projecting a conically diverging light beam of predetermined angle, said reflector also projecting undesired stray light, a plurality of substantially plane opaque and substantially annular screens spacedly arranged from each other and in front of said reflector, the substantially circular openings of said screens in alignment with the reflecting area of said reflector and their areas increasing about proportional to the square of their distance from said reflector, the number and width of said screens and their spacing chosen so as to intercept undesired stray light projected by said reflector within a conus the angle of which substantially exceeds that of said projected beam.

4. As a new article of manufacture, a flood light comprising, in combination, a reflector for projecting a diverging light beam of predetermined shape, said reflector also projecting undesired stray light, an outwardly extending substantially annular opaque wall in front of said reflector, a plurality of substantially annular opaque screens spacedly arranged from each other and said reflector inside of and associated with said wall, said screens extending substantially vertically to the main direction of said beam, the interior opening of said annular wall at least equaling and the openings of said screens exceeding the reflecting area of said reflector so as to closely embrace said projected light beam and to intercept undesired stray light projected by said reflector which would otherwise strike an observer within a predetermined distance outside said shaped beam.

5. As a new article of manufacture, a flood light comprising, in combination, a reflector for projecting a diverging light beam of predetermined shape, said reflector also projecting undesired stray light, a plurality of opaque screens having openings of substantially plane geometrical configuration similar to the reflecting area of said reflector, the areas of said openings exceeding said reflecting area and increasing about proportional to the square of their distance from said reflector, said screens arranged in juxtaposed position and outwardly staggered relation and in front of said reflector, two of said screens each connected with and inclined towards each other so as to intercept undesired stray light projected by said reflector which would otherwise strike an observer within a predetermined distance outside said shaped beam.

FRANS LAMBERT
GERALD SCHNEIDER.