

April 26, 1938.

C. H. GOULDING

2,115,421

HIGHWAY LIGHTING SYSTEM

Original Filed April 27, 1935

FIG. 1

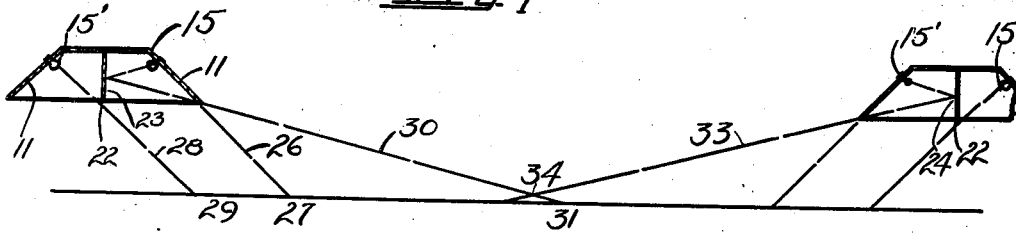


FIG. 2

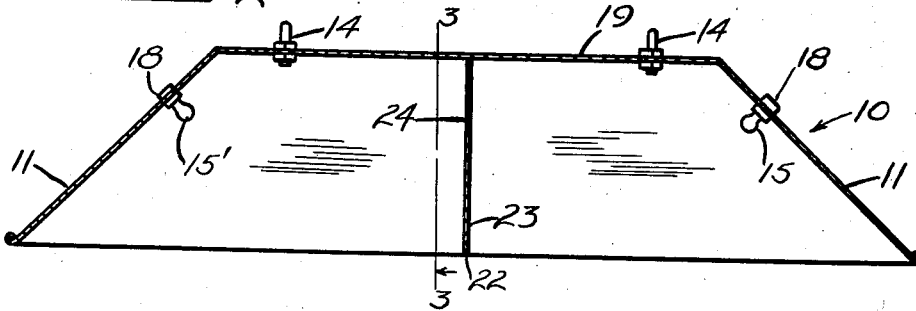


FIG. 3

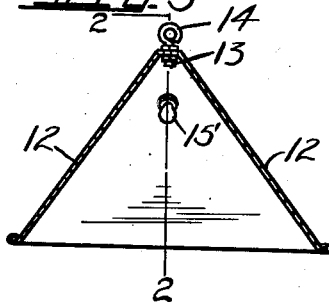


FIG. 4

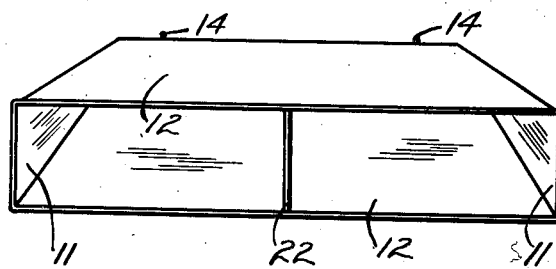


FIG. 5

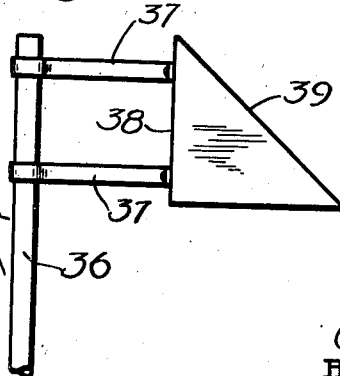
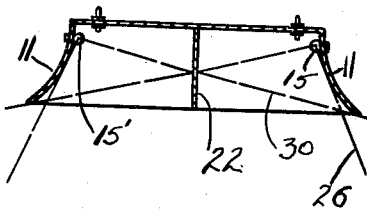


FIG. 6



WITNESS
J. J. Mains

INVENTOR
Charles Goulding
BY
Edward E. Linnert
ATTORNEY

UNITED STATES PATENT OFFICE

2,115,421

HIGHWAY LIGHTING SYSTEM

Charles H. Goulding, Syracuse, N. Y., assignor
of fifty-one percent to Edith R. Hurd, Ballston
Spa, N. Y.

Application April 27, 1935, Serial No. 18,619
Renewed September 22, 1937

5 Claims. (Cl. 240—25)

My invention relates to lighting apparatus and more particularly to a highway lighting system.

A large proportion of the motor accidents occurring at night are caused by defective highway lighting systems. This condition has brought about extensive experimentation with various kinds of highway lighting units in an endeavor to provide a lighting unit which brilliantly illuminates the highway and at the same time causes no glare. Some of this experimentation has been directed along the line of providing a colored light source in the lighting unit such as an amber light. An amber light gives a fair degree of illumination and does not cause a blinding glare in the eyes of an approaching motorist. However, amber lighting units have not been entirely satisfactory due to the fact that the illumination is not as intense as that produced from a white light source. Other experiments have been directed toward providing proper shading for the lighting units whereby the motorist's eyes are protected from the glare of the light.

My invention relates to the latter class of highway lighting units and it is an object of my invention to provide a highway lighting unit in which the source of light is concealed from the view of an approaching motorist.

A further object of my invention is to provide a lighting unit adapted to throw an intense ribbon of light along the highway and the provision of means for preventing an approaching motorist from seeing the light source directly.

My invention further contemplates the provision of a plurality of lighting units adapted to be strung along the highway so as to constitute a complete highway lighting system in which a continuous ribbon of light is thrown along the highway and the provision of means in each of the lighting units for preventing an approaching motorist from being blinded by the glare of the light.

Other objects and advantages of my invention will be more apparent from the following description when taken in connection with the accompanying drawing in which:

Figure 1 is a view illustrating the manner in which the lighting units are mounted over a highway and diagrammatically illustrating the path of light rays therefrom.

Figure 2 is a longitudinal sectional view through one of my novel highway lighting units.

Figure 3 is a view taken on the line 3—3 of Figure 2 in the direction indicated by the arrow.

Figure 4 is a perspective view of my highway lighting unit.

Figure 5 is a view showing a modified construction adapted to permit mounting of the lighting unit at the side of the highway.

Figure 6 is a view of a modified construction of lighting unit shown in Figure 2.

As shown more clearly in Figure 2, my highway lighting unit comprises a shade or reflector, generally indicated by the numeral 10, which, altho it may be made of any suitable material, is preferably made of light sheet metal. The reflector is of elongated narrow construction and is intended to be mounted over the center of the highway with its long axis parallel to the road. The reflector is provided with opposite end shields 11 which diverge as indicated in the drawing so that the direct rays from the light source are confined to a relatively small area along the highway.

The sides 12 of my highway lighting unit preferably also diverge so that at the apex 13 of the reflector an angle of approximately 75 degrees is formed as shown at 13. The angle at the apex will, of course, vary considerably depending upon the width of the road and the height above the road at which the reflector is mounted. Good results may be obtained when the lighting unit is mounted at from about 16 to 25 feet above the highway. At that height the angle at the apex should preferably be sufficient to throw the direct rays of the light just beyond the borders of the road although the angle may be increased if it is desired to throw the direct rays of the light on walks bordering the highway.

Any suitable means may be utilized for mounting the lighting units in a central position over the road. For example, the lighting units 10 may be suspended from brackets 14 on wires strung from poles at opposite sides of the road. Any suitable means may be provided for preventing the reflector from swinging in the wind.

Preferably a pair of light sources 15 and 15' are used in each lighting unit, one mounted at each end of the reflector. The light sources are preferably of rather high candle power and are mounted in lamp sockets 18 provided in the reflector. If desired, instead of a single pair of lights, a cluster of lights may be used at each end of the reflector. Although the light sources 15 and 15' may be mounted so as to depend from the top 19 of the reflector, I have found that much better results are secured and that an approaching motorist is prevented from directly seeing the light source more effectively, when

the light sources are mounted in the diverging end shields 11 of the reflector.

Midway between the light sources and substantially dividing the reflector into two compartments is a dividing wall 22 which is provided on both sides thereof, the surfaces 23 and 24, with a coating adapted to reflect light. These reflecting surfaces may be formed in any well known manner. I have found that the use of a flat white coat of paint provides an excellent surface for reflecting the rays from the light source without causing glare. Preferably the entire interior of the reflector is coated in the same manner with a flat white paint, or any equivalent means of enabling light reflection without glare. For particular installations where it is desired to confine the light to a smaller area along the highway more than one dividing wall may be used extending substantially parallel to the dividing wall 22.

As has been stated, the particular dimensions of the reflector and the angle at which the diverging end shields 11 extend will vary depending upon conditions. When the lighting units are to be used on a little travelled road, it is desirable to make the reflector quite long, perhaps seven or eight feet and make the end shields 11 extend at a more acute angle with the plane of the bottom of the reflector, than that shown. When the lighting units are to be used on heavily travelled roads, it is preferable to space the lighting units more closely together. In that event the lighting units may be shorter and the angle which the diverging end shields 11 make with the plane of the bottom edge of the reflector may be larger so as to confine the direct rays from the light sources to a smaller area.

In Figure 1, I have indicated diagrammatically the path of the light rays thrown from the lighting units when the lighting units are mounted over the highway so as to constitute a complete highway lighting system. Considering the lighting unit at the left side of the paper the limit of the direct rays from the light source 15 is indicated by the line 26. A motorist approaching from the right toward the lighting unit at the left will not be in the path of the direct rays or be able to see the light source 15 until he reaches the point 27. Preferably the angle which the end shields 11 make with the plane of the lower edge of the reflector is such that the point 27 is close enough to the reflector that a motorist seated in his normal position in the driving seat is unable to see the light 15. If desired on little travelled roads for purposes of economy in the number of lighting units required the angle of the end shields may be such that the approaching motorist can only for a short time see the direct glare of the light.

It will be noted that the approaching motorist is unable to see the direct rays thrown from the further light source 15' until he reaches the point 29. Preferably the light sources are positioned and the dividing wall 22 extends downwardly far enough so that the limit of the direct rays from the light source 15', indicated by the line 28, is parallel to the line 26. In this manner the approaching motorist is also prevented from seeing the light source 15' except by moving forwardly from his normal position while driving the car.

Rays of light from the light source 15 are reflected from the reflecting surface 23 of the dividing wall 22 and thrown back along the highway as indicated by the line 30. With the reflector shown in Figure 2 having end shields 11, diverging at the angles shown, point 31 indicates

the maximum distance from the reflector which the lighting unit is capable of throwing reflected rays. It will be apparent that the lighting zone from the reflector at the left extends along the highway from the point 31 to a point an equal distance on the other side of the reflector and that by reason of the sidewalls 12 the light zone is confined to the form of a ribbon of light extending along the highway. There will, of course, be some difference in the intensity of the light on opposite sides of the point 27 because that portion of the highway to the left of point 27 is illuminated by direct rays while that portion to the right is illuminated by indirect rays, still the character of illumination is such as to brilliantly illuminate the highway from the point 31 to an equal distance on the opposite side of the lighting unit.

Although the lighting units may be mounted any desired distance apart it is desirable, especially on heavily travelled roads, that the lighting units be spaced a distance apart such that the reflected rays from adjacent lighting units cross as indicated in Figure 1. The line 33 indicates the maximum distance which rays are reflected from the lighting unit at the right and it will be noted this line crosses the line 30 at the point 34. By properly proportioning each of the lighting units, mounting them at the proper height above the road and spacing them along the highway in a manner such that the reflected rays cross a continuous ribbon of brilliant illumination may be provided along the highway and still the motorist is unable to see any of the light sources since a view of them is blocked by the top of the car and the eyes of the motorist are not in the line of the direct rays from the light sources.

In Figure 5 I have shown a modified form of the construction above described in which the lighting unit is made up substantially the same as that described above except that it is adapted to be mounted on a post 36 at the side of the highway by means of suitable brackets 37. If desired this type of lighting unit may be strung along the highway in staggered relationship with adjacent lighting units on opposite sides of the road and with the reflected rays overlapping as indicated in Figure 1. In this construction the side wall 38 of the reflector is substantially vertical so that the direct rays from the light extend just slightly beyond the edge of the highway but depending upon the position at which the post 36 is mounted, it may be necessary to make the side wall 38 extend at a slight angle to the road so that the direct rays from the light source strike the ground at the desired position. The opposite side of the reflector, the side 39, extends at an angle to the highway so that the direct rays thrown from the light source extend beyond the opposite side of the highway and strike the ground at the desired point.

In Figure 6 I have illustrated a construction in which the end shields 11 are curved. In this construction the direct rays will extend from the light source tangent to the curved portion of the end shield 11. This form of lighting unit will, when the curvature is the proper amount restrict the direct rays closer to the lighting unit while still permitting the reflected rays to be thrown along the road approximately the same distance as the structure of Figure 2.

It will be apparent that I have provided a complete highway lighting system adapted to throw a ribbon of light along the highway and that

various modifications and changes may be made in the lighting unit illustrated and described which do not to any material extent affect the results secured and without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. In a highway lighting system, a lighting unit adapted to be mounted so as to illuminate a highway, said lighting unit comprising a reflector having diverging end shields extending crosswise of the road, a dividing wall extending crosswise of the reflector between the end shields, and a light source mounted in each of said diverging end walls and separated from each other by said dividing wall.

2. In a highway lighting unit adapted to be mounted so as to illuminate a highway, a shade, a pair of light sources mounted in the shade, said shade being of long and narrow construction being mounted lengthwise of the highway and having the light sources mounted near the ends thereof, said shade having diverging side walls depending well below the light sources and being disposed at an acute angle with respect to each other whereby the light is confined substantially to the width of the highway, and said shade having diverging end walls extending at an angle such that the direct rays of the light sources are confined to a space close to the light, and a reflecting dividing wall extending between the light sources and well below them for reflecting the light backwardly along the road beyond the extremities of the direct rays from the light sources.

3. In a highway lighting unit, a shade having diverging end walls and diverging side walls, a light source mounted in each of the diverging end walls, and a reflecting member between the light sources and extending well below them.

4. In a highway lighting unit, means for mounting the unit so as to illuminate a highway, said unit comprising a comparatively long and narrow opaque shade, a pair of light sources

mounted in said shade near the ends thereof and near the top thereof so that the shade extends a substantial distance below the sources of light, a substantially vertically extending opaque reflecting dividing wall between said light sources extending well below the level of the light sources, said shade having side walls extending downwardly in such manner that light is thrown from the light sources just beyond the borders of the highway and said shade having downwardly extending end walls extending at an angle to the vertical such that the direct rays from the light sources are confined close to the lighting unit, said shade and said reflecting dividing wall being so constructed and arranged relative to each other that the reflected rays from the light sources are thrown in a ribbon along the highway in both directions a substantial distance beyond the limits of the direct rays.

5. In a highway lighting unit, means for mounting the unit so as to illuminate a highway, said unit comprising an opaque shade, a plurality of light sources mounted in said shade near the top thereof so that the shade extends a substantial distance below the sources of light, a substantially vertically extending opaque reflecting dividing wall between said light sources so that a source of light exists on each side of said dividing wall, said dividing wall extending well below the level of the light sources, said shade having side walls extending downwardly in such manner that light is thrown from the light sources just beyond the borders of the highway and said shade having downwardly extending end walls extending at an angle to the vertical such that the direct rays from the light sources are confined close to the lighting unit, said shade and said reflecting dividing wall being so constructed and arranged relative to each other that the reflected rays from the light sources are thrown in a ribbon along the highway in both directions a substantial distance beyond the limits of the direct rays.

CHARLES H. GOULDING.