Jan. 16, 1923. 1,442,681.

R. M. CRAIG.

ROAD ILLUMINATION FOR VEHICLES.

FILED NOV. 22, 1921. 2 SHEETS—SHEET 1.

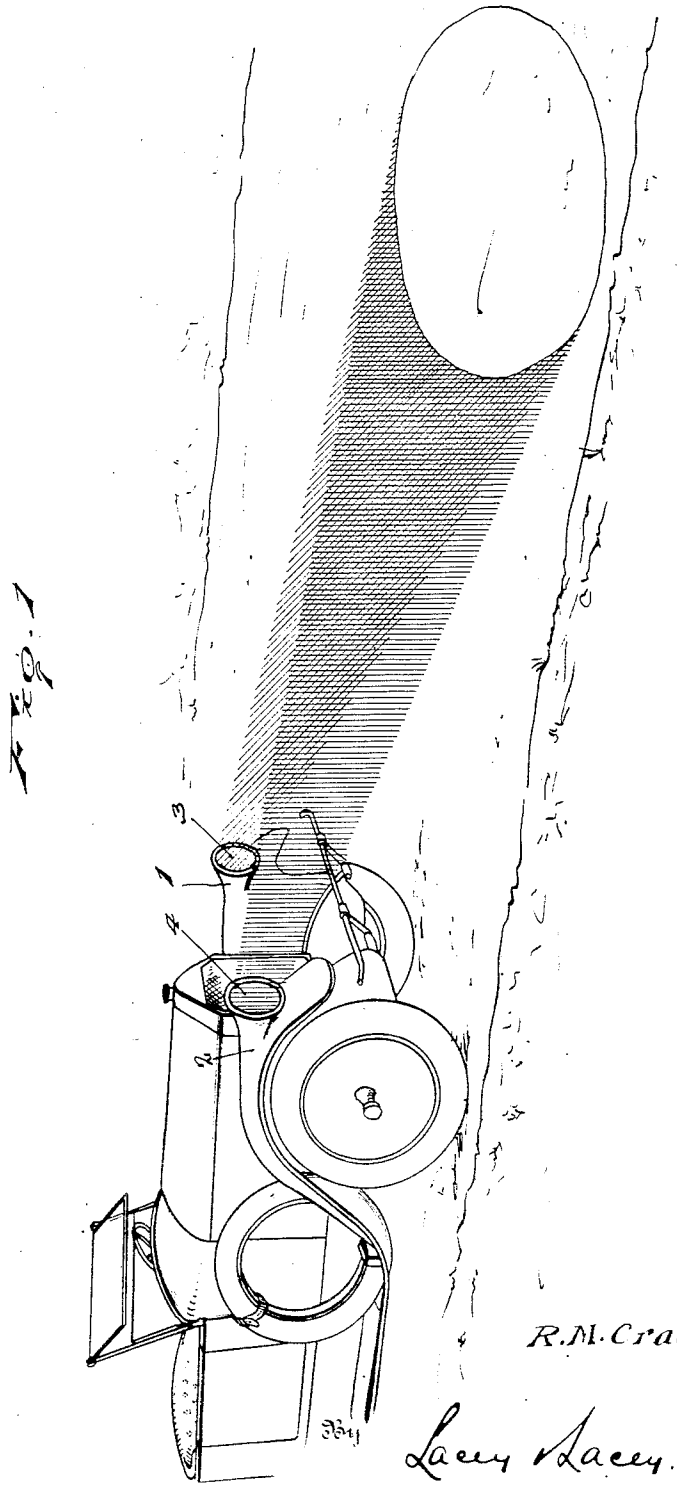


Fig. 1.

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Fig. 3.

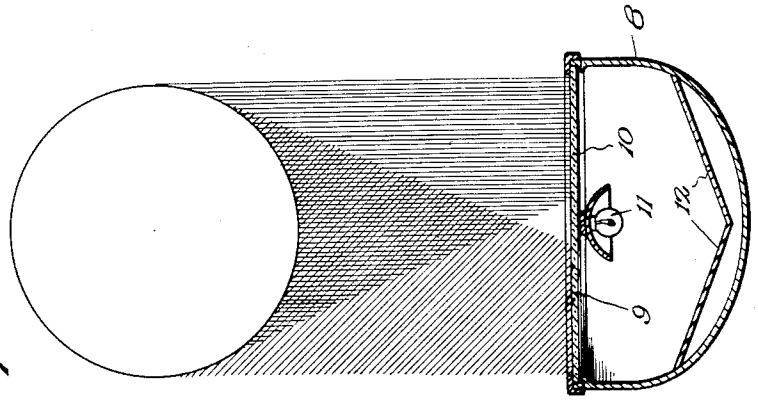
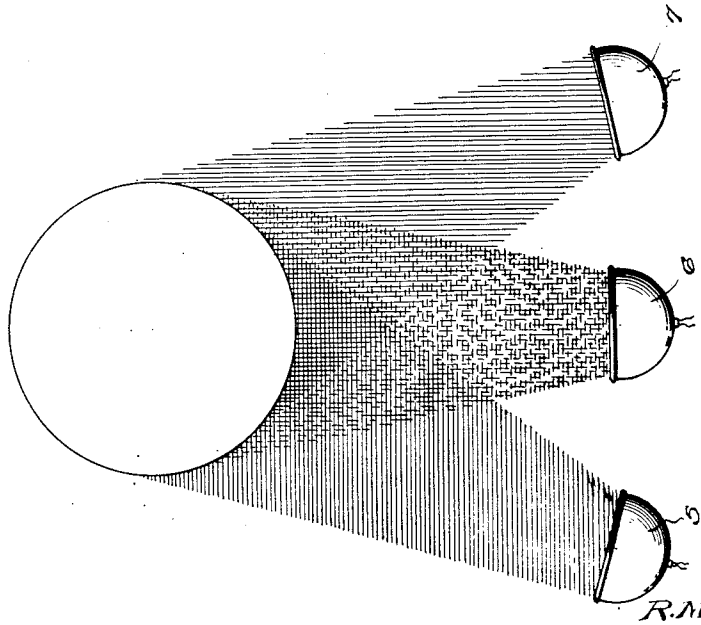


Fig. 4.



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UNITED STATES PATENT OFFICE.

RICHARD M. CRAIG, OF SAN ANTONIO, TEXAS.

ROAD ILLUMINATION FOR VEHICLES.

Application filed November 22, 1921. Serial No. 516,984.

To all whom it may concern:

Be it known that I, RICHARD M. CRAIG, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Road Illuminations for Vehicles, of which the following is a specification.

This invention relates to an improved means for illuminating the path of travel of vehicles of any and all types whether employed upon land or water or in the air, and is designed to overcome the many disadvantages presented by the present means of illumination.

To present a concrete example, the difficulties experienced in providing a suitable means for illumination upon an automobile, will be considered. Where clear lenses are employed the glare from the headlights is blinding to one facing in the direction of the approaching car and it is well known that this is the cause of many serious accidents. In practically every community ordinances have been promulgated having as their purpose the regulation of the headlights of automobiles and other vehicles either by restricting the candle power of the electric bulbs or other source of illumination employed or by requiring the use of lenses of approved types. There are many such lenses on the market but they are all expensive and all seek to overcome the difficulty by cutting off a greater or less portion of the light. Even where electric bulbs of low candle power are employed, racing of the engine in some types of cars will greatly multiply the rated candle power and thus defeat the purpose in view. Where lenses are employed with the object in view of cutting off all light except the rays which will be reflected downwardly onto the road surface, it is obvious that a considerable portion of the light from the source of illumination is cut off and the full benefit thereof is not obtained. Furthermore such lenses, because of the vibration of the machine, are likely to rotate in their mountings and in time assume a more or less inverted position so that they then not only cut off the light from the road surface but deliver the rays in a more or less upward direction where they will surely prove blinding to an observer. The same general difficulties attend the use of headlights upon motor cycles, locomotives, street and suburban railway cars, the search lights upon vessels and air-craft, and in fact all similar sources of illumination employed under like general conditions.

In consideration of the foregoing it is the primary object of the present invention to provide an illuminating means adapted for general application in the respects outlined above and which will overcome all of the disadvantages enumerated and present certain advantages which cannot be obtained by the usually employed sources of illumination.

White light, through some peculiar action or effect upon the mass of nerve ends comprising the retina of the eye, is blinding to the observer particularly where the rays are strongly reflected. On the other hand the cones of the retina are capable of selectively receiving colored light rays without this blinding effect. For example I have found that one may look directly at a powerful light if the rays are tinted and without experiencing the effect of blindness. Taking this established fact into consideration and the further fact that complementary diad and triad spectral colors, when blended, produce white light I propose to make use of sources of illumination of complementary colors for the purpose of obtaining the desired illumination of the path of travel of the vehicle upon which the sources of illumination are carried, and without subjecting any observer to the blinding glare of white light.

In the accompanying drawing:

Figure 1 is a perspective view illustrating an automobile equipped with a source of road illumination in accordance with the present invention;

Figure 2 is a diagrammatic view illustrating the manner in which the invention may be practiced where triad complementary colors are employed;

Fig. 3 is a similar view partly of a mechanical nature illustrating another embodiment of the invention.

In that embodiment of the invention illustrated in Figure 1 of the drawings the automobile or other vehicle is equipped with two headlights, as usual, indicated by the numerals 1 and 2. These headlights need not differ structurally from any ordinary headlight of the type which it may be desired to employ, except as regards the character of

the lenses. The lenses which are indicated respectively by the numerals 3 and 4 may be of clear glass except that the lens 3 is tinted green or blue-green and the lens 4 is tinted red. At this point it may be mentioned that as an alternative to this construction the bulbs of the headlights might in themselves be tinted in the colors stated and the lenses might be of clear glass, untinted. It may also be remarked at this point that in this example, where diad colors are employed, any two complementary colors would no doubt serve the purpose, more or less effectively, although I prefer, in selecting the colors, to divide the spectrum as nearly as possible into two parts so as to obtain the best results. The headlights thus equipped are focused in the usual manner so as to direct the reflected rays onto the road surface in advance of the automobile as illustrated in Figure 1 and the areas of illumination produced by reflection of the rays from the two headlights will merge and overlap upon the surface of the roadway forming a white light area illuminating the roadway as effectually as though headlights were employed of the ordinary type and capable of reflecting only white light rays.

As before stated the cones of the retina of the eye possess the property of being selectively affected by light rays of the different colors and therefore anyone looking directly at the headlights of a machine equipped as illustrated in Figure 1 would observe a red light on one side and a green light on the other but there would be no blinding effect produced although the light delivered from the two headlights will be in every way sufficient for the purpose of permitting the observer to definitely locate the vehicle and avoid it. The blending of the rays from the two headlights is productive of white light only where the rays strike the surface, and therefore the result of the arrangement illustrated will be an area brilliantly illuminated by a white light directly in the path of the machine but the sensation of white light rays will not be experienced by anyone looking directly at the headlights.

The same principles are involved in the modification shown in Figure 2 of the drawings except in this instance three headlights are employed indicated by the numerals 5, 6 and 7. Thus either the headlight 5 or the headlight 7 may be of red and the other one of blue-violet, and the headlight 6 is of yellow-green. These are complementary triad colors and when the rays from the three headlights are directed onto a surface an area brilliantly illuminated by white light will be the result. In this case as in the previously described embodiment, I have stated a specific example of triad colors which may be employed but it will be evident that other selections of complementary triad colors may be made without departing from the spirit of the invention.

Fig. 3 of the drawings illustrates a modification in which rays of two or more colors are to be reflected from a single headlight which is indicated by the numeral 8 and is provided with a lens comprising sections 9 and 10 respectively tinted green and red, blue-green and red, or any other two complementary diad colors, an electric bulb 11 being suitably situated with relation to the reflector 12 of the headlight so as to properly reflect the rays through the lens sections.

In the foregoing I have enumerated several advantages which are obtained by the carrying out of the invention but there is still another advantage which is of great value namely that the color of the headlights will indicate to an observer the right and left hand sides of the vehicle and this even should one of the headlights be temporarily out of commission.

I have discovered that the best results are obtainable when the same number of foot-candles are reflected from each of the headlights, and in balancing the intensity of the illumination, the lenses may be tinted to obtain the desired results or globes of different candle power may be employed, or these results may be brought about in any other way found convenient.

Having thus described the invention what is claimed as new is:

1. The method of illuminating a roadway in advance of a vehicle which comprises projecting, along converging lines, on to the surface of the roadway from a source at one side of the vehicle light rays of one color only, and projecting on to the roadway from a source at the opposite side of the vehicle light rays of a single complementary color, whereby a blending of the colored rays will produce a substantially white-light area upon the surface of the roadway.

2. Means for illuminating the path of travel of a vehicle by substantially white light comprising a plurality of independent light projecting devices relatively widely spaced from each other across the front of the vehicle and each capable of delivering light rays of a single color complementary to the other along converging paths whereby the rays from the several sources will blend in falling upon the road surface to produce an approximately white-light illuminated area, and whereby because of the relatively wide spacing of the sources the lights will be individually presented to the view of an observer facing the said sources.

3. In combination, vehicle headlights arranged in spaced relation in the ordinary manner and one equipped with means for delivering light rays of one complementary color of white-light, and the other with

means for delivering light rays of another single color complementary to the first-mentioned color, the headlights being focused to effect a convergence of their respective rays to such an extent and in such manner that the rays will blend substantially only at and adjacent the point where they fall upon the road surface whereby their blending at this point will produce a white-light illuminated area, and whereby, through the independent spaced relation of the sources, they will be individually presented to the view of an observer facing said sources as lights of different colors indicating respectively the right and left side of the vehicle.

In testimony whereof I affix my signature.

RICHARD M. CRAIG. [L. S.]