W. T. CONN.

LIGHT PROJECTOR.

APPLICATION FILED JULY 30, 1919.

1,361,018. Patented Dec. 7, 1920.

Fig. 1

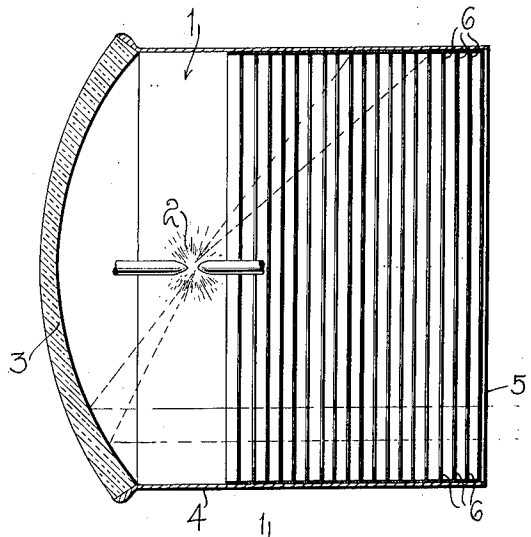


Fig. 2

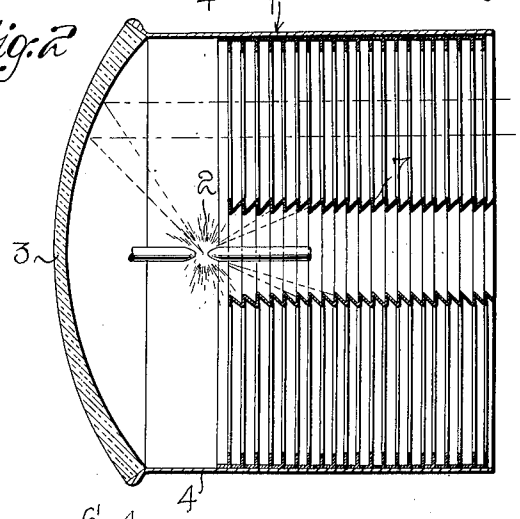


Fig. 3

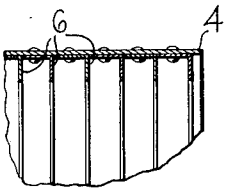
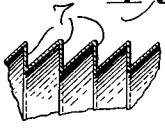


Fig. 4



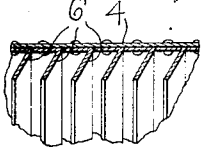


Fig. 5

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UNITED STATES PATENT OFFICE.

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LIGHT-PROJECTOR.

1,361,018. Specification of Letters Patent. Patented Dec. 7, 1920.

Application filed July 30, 1919. Serial No. 314,366.

(FILED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

To all whom it may concern:

Be it known that I, WALLACE T. CONN, a citizen of the United States, residing at St. Marys, Elk county, Pennsylvania, have invented an Improvement in Light-Projectors, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment of any royalty thereon.

This invention relates to light projectors in general but more especially to the class of searchlights in which a source of light, usually an arc light mechanism, is combined with a mirror of such form as to direct the reflected light rays in parallel directions. Searchlights find a wide application in military and naval operations and it is desirable that a powerful beam of light be furnished with as little dispersion as possible. It is not possible to eliminate all dispersion, which is caused partly by errors in the shape of the mirror, partly by the direct projection of light from the arc itself and partly by the reflection of light from parts of the searchlight other than the mirror. The latter two sources of spreading rays give rise to what is known variously as ground light, fore light or stray light and this is obviously of a highly objectionable nature in all searchlights. This is especially true in those designed for military purposes, where these stray rays illuminate the ground in the vicinity of the projecting mechanism, exposing friendly objects to enemy bombing planes.

This invention is designed to provide means for eliminating all ground light both reflected and direct.

Another object is to provide means for performing this function without materially reducing the size or intensity of the beam projected.

As a further object, it is contemplated to provide a device, which will not add excessive weight nor reduce to any extent the mobility of the projector.

To accomplish the desired result of eliminating the spreading rays it is proposed to use a series of opaque planes to be located in the line of the projection of the rays of ground light. These planes may be made of any suitable opaque material and are in general to be placed perpendicular to the light rays reflected from the mirror. No restriction is made otherwise as to position or size. In use in connection with the barrel type of searchlight, the planes in one modification may be attached to the inside walls of the barrel to prevent reflection of light therefrom, and when a series of planes is placed in proper relation to the arc, a large part of the objectionable reflection is obstructed.

It is obvious that the use of these opaque planes is not limited to searchlights employing an arc as a source of illumination but may be used to the same end in any sort of light projector which is designed to throw a beam of parallel or substantially parallel rays.

In the embodiment above suggested, the planes are to be in such a spaced relation that light projected from the arc and reflected from the walls of the barrel will be obstructed and so prevented from passing out through the front glass of the barrel type lamp. It is true that the location of the planes within the barrel will reduce the amount of useful light, to a small extent, but this objection is minimized by making the planes narrow and proportionately closer together.

It has been found, as shown in the co-pending application of Chas. G. Abbot, Serial No. 293,785, filed April 30, 1919, that with a parabolic mirror, the angular spread of the beam increases as the source of light is moved toward the mirror, and it follows that most of the reflected spreading rays arise from the central portion of the mirror. It also follows that the outer zones of the mirror give a more concentrated beam than the inner zones. In view of the above considerations, it is found that by the use of a cylinder placed within the barrel of the searchlight, with the axis parallel to the inside walls of the barrel, and bearing on its inner surface a series of parallel vanes, the elimination of the greater portion of the ground light is accomplished.

If the cylinder is made of relatively small diameter, the loss of useful light due to the interposition of the vanes in the path of the reflected rays, is reduced to a minimum, due

to the inner zones of the mirror giving a less concentrated and more spreading beam, and at the same time, the elimination of the spreading rays is made much more effective, for the same reasons. This inner cylinder bearing the vanes is to be made preferably of a diameter equal to or less than half of the diameter of the mirror, so as to bring it within those zones of the mirror giving forth the less concentrated rays. It is to be placed in such a position that it will not cut off rays of light from the arc projected toward the mirror, and accordingly the end of the cylinder toward the mirror will be located at a point nearly opposite the arc crater. The cylinder may be supported in position in any suitable manner.

It is obvious that in this invention the shape of the opaque planes is not limited in method of construction. They may be formed in the well known saw-tooth form, in the form of an L or any other modification, which permits the same use.

In the accompanying drawings there are shown various embodiments of the invention as applied to searchlights of the well known barrel form.

Figure 1 is a longitudinal sectional view of a searchlight showing one form of the invention in place;

Fig. 2 is a longitudinal sectional view of a searchlight showing a different form of the device in use;

Figs. 3 and 4 are views showing details of construction of different features of the invention;

Fig. 5 is a view of a detail of the vane construction.

In Fig. 1 the searchlight 1 is seen to comprise a source of light 2, here represented as an electric arc, and a mirror 3. A barrel 4 is provided inclosing the arc mechanism, the front opening being covered by the usual glass door not shown. Within the barrel and attached thereto in any suitable manner is a series of inwardly extending parallel vanes 6, 6. In this particular embodiment of the invention, the vanes extend inwardly substantially at right angles to the surface of the barrel, though it is to be understood that the rectangular relation of the vanes to the barrel in no sense limits the construction. As shown in Fig. 5, the vanes may be inclined at an obtuse angle to the surface of the barrel.

In order that the direct ground light, may be done away with to as great an extent as possible, the invention is used in a modified form, as represented in Fig. 2. Here there is shown a cylinder 7, mounted within the searchlight barrel in close relation to the arc mechanism. This cylinder may be of sheet metal or other suitable material, provided on its inner surface with the parallel vanes as illustrated in Fig. 1, or it may be made of saw-tooth section as shown in Fig. 2. The use of the saw-tooth section form, it will be noted from Fig. 4, serves the same purpose as the series of parallel vanes, but provides a method of construction that will undoubtedly prove more economical to produce.

By the use of a cylinder provided with internal vanes, mounted in front of the source of light, as shown in the drawings, the greater portion of these direct diverging rays is eliminated, being obstructed by the opaque planes or vanes. The smaller the diameter of the cylinder, the more effective the obstruction becomes, though it is to be understood that there are limits, in this reduction in the size, set up by considerations of convenience in the operation of the mechanism furnishing the light. By bringing the inner edge of the cylinder to a point nearly opposite to the source of light, it will be seen that a further object is accomplished in the obstruction and elimination of indirect ground light, *i. e.*, ground light made up of rays reflected from the interior of the barrel to the outside. This result follows from the fact that by this construction, little or no light is permitted to strike the barrel directly.

The use of this inner cylinder, as above described, serves another purpose, in that by its location it has a tendency to obstruct light rays projected directly by the source of light upon the barrel and reflected therefrom, one or more times, to pass out through the front in diverging directions. This obstruction is more readily accomplished in the case of the use of the cylinder of saw-tooth construction. In this form the outside of the cylinder may be seen to have the same relation to light rays reflected from the barrel, as the inner surface bears to the diverging rays projected directly upon its surface by the source of light. That is to say, the outer surface of the cylinder serves to interpose in the path of these reflected rays, a series of opaque plane surfaces, which serve to obstruct these rays and prevent them from leaving the projector. By its location at the center of the projected beam the cylinder will be seen to be placed at the most effective position to obstruct light reflected from the barrel surface and either used alone, or in connection with planes attached to the barrel itself, the obstruction of diverging light rays is complete for all practical purposes.

The loss of useful light resulting from the use of the vaned cylinder is obviously very small. No part of the rays of light given off by the source is prevented from reaching the reflecting mirror and the only loss that takes place is from the interposition of the cylinder in the path of the rays reflected in parallel directions from the mirror. Inas-

much as the only area of the cylinder that is effective as a screen with regard to the parallel rays reflected from the mirror is in the form of a ring of diameter equal to that of the cylinder and of width equal to the width of the vanes, it will be seen that the actual loss of light is a negligible feature. Aside from the slight screening of reflected rays, the obstruction of other light rays results in a loss of light, which is in itself detrimental to the effective use of the projector. This is a matter of advantage, the importance of which has been previously explained at length.

In the case of vanes supported by the barrel itself, the loss of effective light is determined by the screening effect of the vanes. As these may be made of small depth, without loss in efficiency, the vanes being increased in number and placed closer together, the actual loss of light due to this screening is so small as to be negligible.

What I claim as new and desire to secure by Letters Patent is:

1. In a light projector, a source of light, a reflecting mirror, an inclosing barrel, and means for obstructing light rays tending to leave said projector in diverging directions, including deflecting vanes radially projecting from the inner circumference of the inclosing barrel.

2. In a light projector, a source of light, a reflecting mirror, an inclosing barrel, and an annular series of deflecting vanes radially projecting from the inner circumference inclosing barrel for obstructing light rays tending to leave said projector in diverging directions.

3. In a light projector, a source of light, a reflecting mirror, an inclosing barrel, a cylinder in front of said source of light and means mounted on said cylinder to obstruct light rays tending to leave said projector in diverging directions, including a series of deflecting vanes parallelly projecting in planes at right angles to the longitudinal axes of the cylinder.

4. In a light projector, a source of light, a reflecting mirror, an inclosing barrel, a cylinder lying in the path of the rays of light reflected from said mirror, said cylinder being crimped to form a series of opaque parallel planes, interposed in the path of and adapted to obstruct rays of light tending to leave said projector in diverging directions.

WALLACE T. CONN.