Feb. 17, 1942. C. ADLER, JR 2,273,748

AIRPLANE LIGHT

Filed Aug. 7, 1941

Fig. 1.

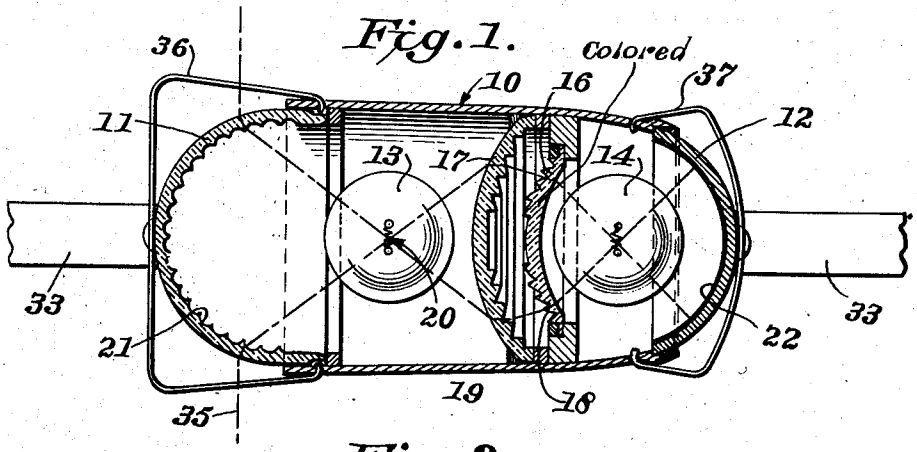


Fig. 2.

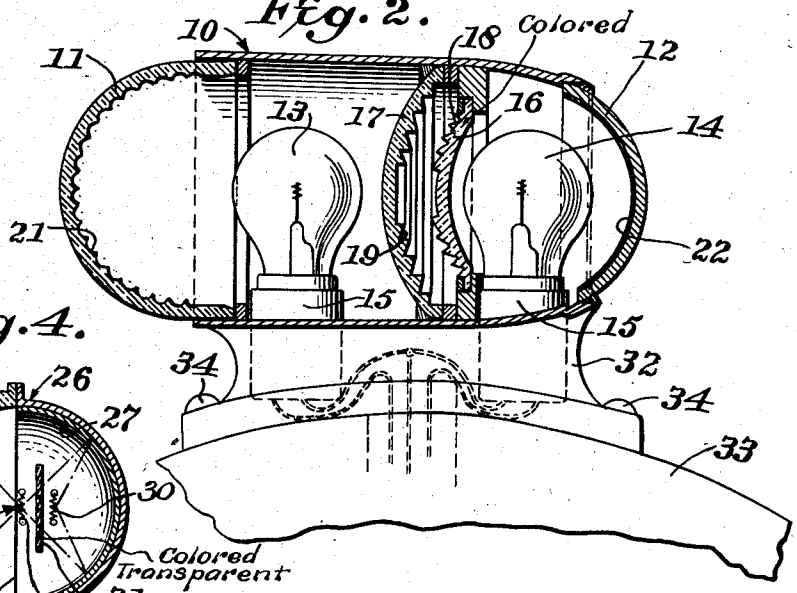


Fig. 4.

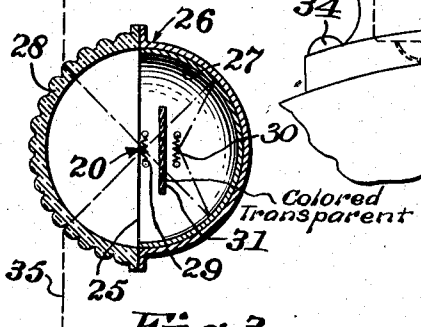
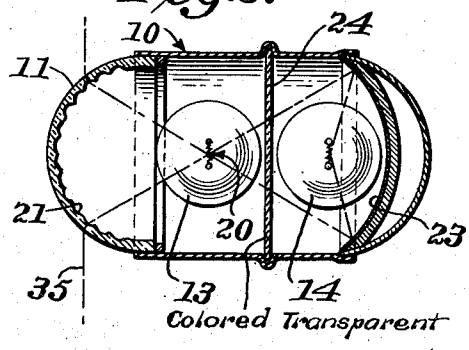


Fig. 3.



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2,273,748

AIRPLANE LIGHT

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Application August 7, 1941, Serial No. 405,867

3 Claims. (Cl. 177—329)

This invention relates to running or position lights and is particularly useful in connection with airplanes where it is adapted to be attached, for example, to the rudder as a tail light.

The object of the invention is to provide a light of this character in which there is continuously projected alternately from a single visible area, namely, a cover glass, rapidly consecutive contrasting colored light indications of substantially equal intensity and distribution whereby a highly distinctive and arrestive form of indication is produced having the particular advantage that there is no increase in drag or appreciable adding of weight.

It is generally admitted that the conventional steady white tail light lacks distinction and is readily confusted with lights on the ground. A flashing white light, while an improvement, still as actual tests show, may be confused with lights of moving vehicles on the ground such as automobiles passing under trees or moving past telegraph poles. The lamp of the present invention flashes alternately white and another color such as red or green and includes two independent light sources with means for alternately continuously energizing the same for predetermined time intervals and an optical system having means for causing rays of light from one source to converge at the other source and pass through this other source as rays which are colored and coincident with the paths of rays from said other source (when the latter is selectively energized). The entire unit is streamlined in accordance with aerodynamic principles and both colors are projected from a single opening or cover glass through angles ranging from 140° to 180° horizontally as well as vertically, the light sources being disposed in longitudinal alignment with each other substantially on the axes of the members of the optical system. The light unit has no moving parts and a flasher relay is preferably employed which is located remote from the light inside the airplane where it will not be subject to freezing.

In the accompanying drawing I have illustrated several embodiments of the invention, and the invention is subject to modification within the scope of the appended claims.

Referring to the drawing:

Figure 1 is a horizontal sectional plan view;

Figure 2 is a vertical sectional plan view;

Figure 3 is a horizontal sectional plan view of a modification; and

Figure 4 is a horizontal sectional plan view of a further modification.

Referring to Figure 1, the numeral 10 indicates a housing or casing which is made of metal or plastic and which is substantially tubular in cross section. At one end of the housing there is detachably secured a suitable cover glass 11 which forms a single visible signal area and at the opposite end of the casing, there is a detachable opaque end 12. The cover glass 11, body 10 and end 12 are streamlined in accordance with aerodynamic principles.

In a preferred form of the invention, two light sources in the form of incandescent electric lamps 13 and 14 of suitable candlepower are disposed in longitudinal alignment with each other and with the cover glass 11 in the casing 10, the lamps being held firmly in position in the usual bayonet sockets 15.

Disposed in advance of the light source 14 is a convex lens 16 and preferably a doublet lens arrangement consisting of the lens 16, and a convex lens 17 spaced as shown in Figure 1 is provided. While I have illustrated the convex lens 16 as smaller in diameter than the lens 17, both lenses may be of the same size. It has been found, however, to be good practice, to have the lens 16 of smaller diameter and also to have the lens 16 with its prismatic steps 18 on the convex side and the lens 17 with its prismatic steps 19 on the concave side. The filaments of the lamps are longitudinally aligned substantially on the axes of the lens 16 or lenses 16—17, the cover glass 11 and a concave reflector where the latter is employed, as will be later described.

The important consideration as regards the optical system is to so focus the light sources and lens or lenses that rays of light from the source 14 are refracted by the lens or lenses so that the rays converge at the filament of the light source 13 as shown at 20 and pass through this other source as colored rays which are coincident with the paths of the rays from the light source 13 when the latter is selectively energized.

This construction is advantageous because it permits the light sources to be disposed in longitudinal alignment with each other and on the axes of the lens or lenses and the cover glass and reflector when the latter is used, so that a small compact structure is provided which does not create drag, and assures that the intensity and distribution of both the white light and the red or green light will be substantially the same when alternately presented at the signal area 11.

The lamp 14 may be suitably colored or one or the other of the lens 16 or 17 may be colored. The cover glass 11, of course, is clear.

When the lamp 14 is illuminated, a red beam is visible through the cover glass and when the lamp 14 is de-energized and the lamp 13 is energized, a white beam is visible. The cover glass is of any suitable construction which will give a wide light distribution, e. g. from 140° to 180° and in the present instance, I have shown it as a prismatic structure at 21.

In some cases, although it is not usually necessary, a suitable reflector 22 may be employed to utilize the rays which may be directed rearwardly from the lens as shown in Figures 1 and 2.

Referring to Figure 3, I have shown a modification in which an elliptical reflector 23 is employed. With this construction, the rays from the light source 14, directed upon the reflector 23, are reflected thereby as shown to also converge upon the filament of the lamp 13 in the manner previously described. The lens or lenses 16 or 16—17 are omitted in this construction and instead thereof I will either use a colored lamp 14 or an ordinary lamp with a suitably colored roundel 24. In this construction, the filaments are longitudinally aligned on the axes of the reflector and cover glass and the roundel where used and a light weight structure in which drag is substantially eliminated, is produced.

While I have illustrated the casing and housing with two independent light sources, e. g. incandescent lamps, it is to be understood that the housing itself may be a sealed bulb or casing in which are disposed two filaments and the preferred and modified constructions may be incorporated in the same or preferably a reflecting surface is employed and a red transparent screen is interposed between the filaments after the manner of Figure 3. Referring to Figure 4, I have illustrated a construction of this character in which the streamlined body 26 is of suitable material such as glass or plastic and formed into an integral sealed bulb which may be cylindrical and which is either gas filled or evacuated. At one end and on the exterior or interior thereof, the bulb is suitably silvered to provide a mirror surface 27 in the form of a substantially spherical structure. At its opposite or light visible end 28, the glass has a prismatic contour. Preferably the end 28 is attached to the mirrored portion of the body by fusing to make a sealed container in the well known manner as shown at 25. Within the bulb are supported a pair of light sources 29 and 30 and between these sources is supported a transparent screen 31 which is suitably colored red, green or any color desired. In this construction, the filaments are longitudinally aligned on the axes of the screen and reflector and cover glass, and the optical system and the filaments are so positioned and focused as with all of the other constructions described herein that rays of light from the light source 30 converge at the other source 29 and pass through the same as rays which are colored and in paths coincident with the rays from the source 29. The structure eliminates any increase in drag and the weight of the light is not appreciable.

Referring to Figure 2, I have illustrated the casing 10 as supported upon a siutable bracket 32 rigidly secured to the rudder 33 by bolts or screws 34.

I have illustrated in Figures 1, 3 and 4 diagrammatically the path of rays from the lamp 14 and the filament 30 and in all cases the filaments or light sources and the members of the optical system are so positioned and focused that these rays converge at the filament of the lamp 13 or the filament 29, as shown at 20, as colored rays and pass through these filaments to the cover glass 11 from which they are projected outwardly through angles of substantially 140° to 180° as shown at 35. The paths of the rays from the point 20 of the filament of the lamp 13 or from the filament 29 to the cover glass when the filament of lamp 14 or the filament 30, respectively, is energized are coincident with the paths of rays given off from said filaments 13 and 29 when the same are energized, so that the alternate light indications from the cover glass 11 are of substantially equal intensity and distribution.

The numerals 36 and 37 indicate wire fastening means for detachably connecting the cover glass and opaque end of the casing to the body thereof. Other suitable connecting or holding means may, of course, be used.

The term "light projecting devices" as used in the appended claims, is intended to cover any combination of light source and color producing means so as to comprehend the clear lamps 13 and the construction for producing a contrasting color wherein the lamp 14 either has its bulb surface colored or is associated with any suitable type of color producing means such as a colored lens, a colored roundel, or a colored screen. In other words, the expression "light projecting devices" is intended to cover the means by which beams differently colored from and contrasting from each other are produced.

This application includes related subject-matter of my co-pending applications Serial Nos. 408,393 and 406,037.

I claim:

1. An airplane position signal comprising an elongated housing thereby offering a minimum of resistance to air flow, two light projecting devices disposed one behind the other longitudinally of the housing, said light projecting devices comprising light sources and the rearmost of said sources having associated therewith means for producing light rays of a color contrasting with rays produced by the other source, means for causing the colored rays from the said rearmost source to converge at the said other source, and cover glass means for distributing the light from said devices through an angle of at least 140° horizontally and vertically.

2. An airplane position signal comprising an elongated housing thereby offering a minimum of resistance to air flow, two light projecting devices disposed one behind the other longitudinally of the housing, said light projecting devices comprising light sources and the rearmost of said sources having associated therewith a colored screen for producing light rays of a color contrasting with rays produced by the other source, a reflector for causing the colored rays from the said rearmost source to converge at the said other source, and cover glass means for distributing the light from said devices through an angle of at least 140° horizontally and vertically.

3. An airplane position signal comprising an elongated housing thereby offering a minimum of resistance to air flow, two light projecting devices disposed one behind the other longitudinally of the housing, said light projecting devices comprising electric lamps and the rearmost of said lamps being colored for producing light rays of a color contrasting with rays produced by the other lamp, means for causing the colored rays from the said rearmost lamp to converge at the said other lamp, and cover glass means for distributing the light from said devices through an angle of at least 140° horizontally and vertically.

CHARLES ADLER, JR.