Oct. 27, 1936. W. G. GRIMES 2,058,977

POSITION LIGHT

Filed Feb. 4, 1935

Fig. 3.

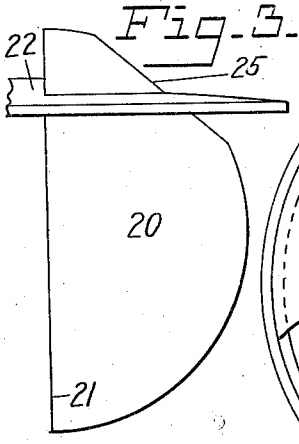


Fig. 1.

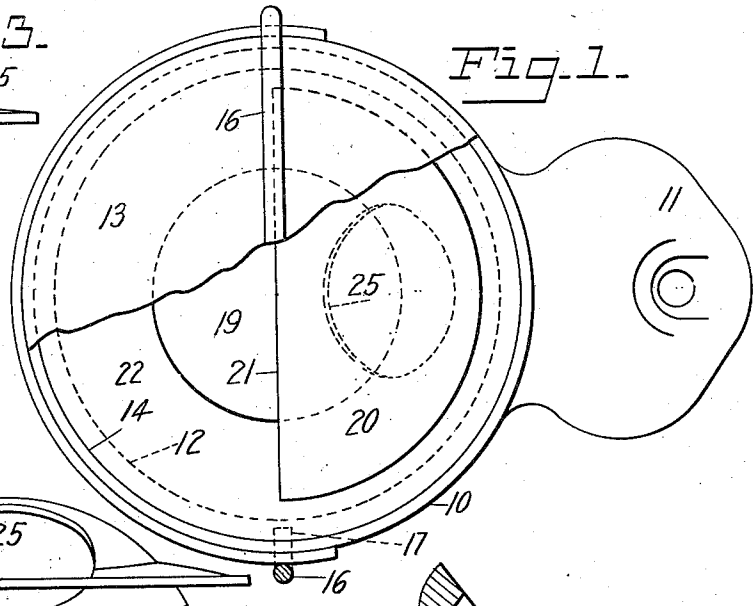


Fig. 4.

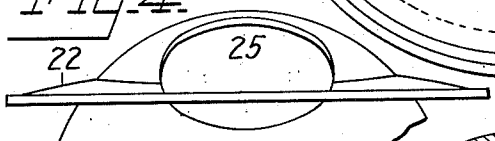


Fig. 2.

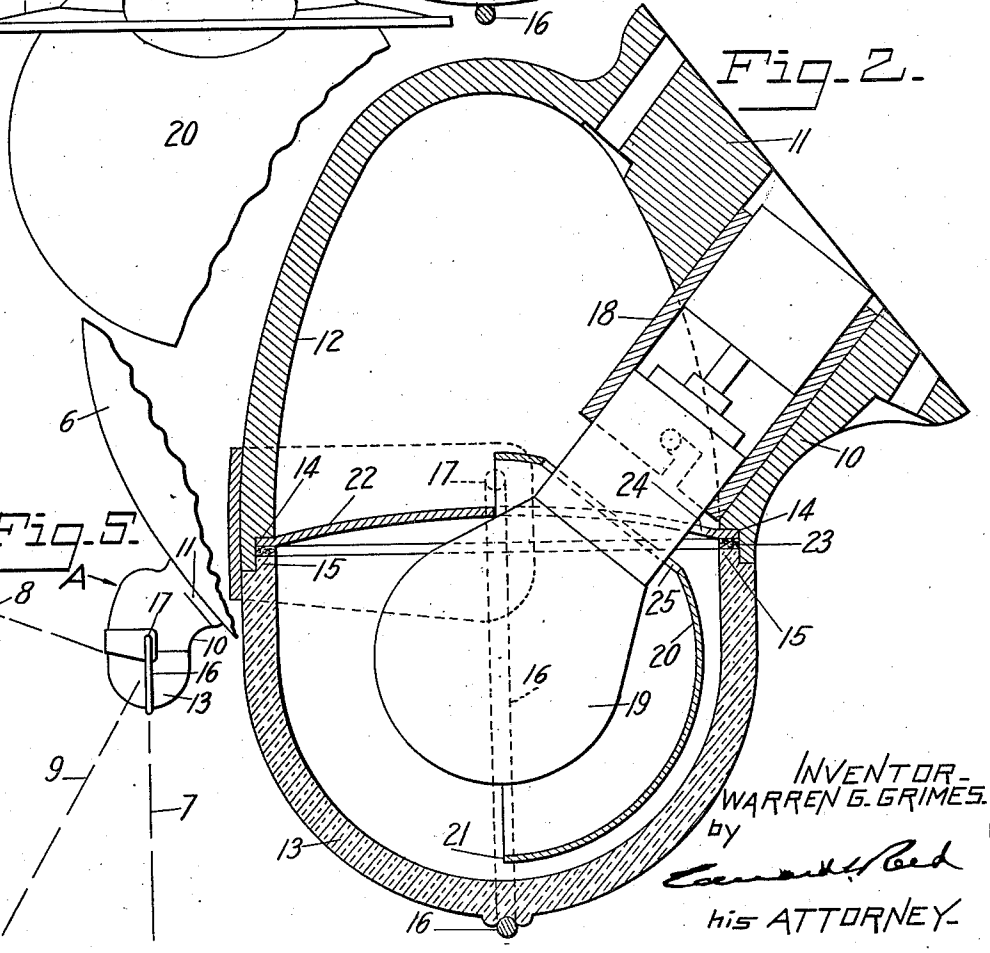


Fig. 5.

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POSITION LIGHT

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3 Claims. (Cl. 240—7.7)

This invention relates to position lights for airplanes, which are sometimes called navigation lights. The regulations relating to aerial navigation require that position lights shall be of such a character that the light will be visible in certain directions only and that the light shall have a long range of visibility through at least a portion of its visible area, such as that area which is visible from a position straight ahead of the light. Heretofore in order to meet these requirements it has been necessary to use high candle power lamps which are objectionable for at least two reasons. First, they consume relatively large amounts of current and this requires the airplane to carry a relatively large battery, the weight of which is objectionable. Second, such a lamp requires a large fixture which has a relatively high wind resistance, which is objectionable.

One object of the present invention is to provide a position light which will confine the rays of light to the desired area and which will have the desired intensity when used with a small candle power lamp.

A further object of the invention is to provide a position light of such a character that light rays which would otherwise have no value may be utilized to supplement other light rays and thus secure the desired intensity or long range visibility in the desired area.

A further object of the invention is to provide a position light which will be simple in construction, of small size and which may be produced at a small cost.

Other objects of the invention will appear as the device is described in detail.

In the accompanying drawing Fig. 1 is a front elevation of a position light embodying my invention, with the glass closure partly broken away; Fig. 2 is a longitudinal sectional view taken centrally through such a fixture; Fig. 3 is a plan view of the reflectors with the transverse reflector, partly broken away; Fig. 4 is a side elevation of the reflectors with the cup-shaped reflector partly broken away; and Fig. 5 is a plan view of a portion of a wing tip showing the position light mounted thereon.

In the drawing I have illustrated one embodiment of my invention but it will be understood that this embodiment has been chosen for the purposes of illustration and that the device may take various forms without departing from the spirit of the invention.

The invention is here illustrated as embodied in a wing light, which, as shown at A in Fig. 5, is mounted on the tip 6 of an airplane wing, it being understood that there will be one of these position lights on a wing tip at each side of the plane. The regulations require that such a position light shall be visible from a straight ahead position but shall not be visible from a position on the inner side of a fore and aft line extending through the light fixture, such a line being shown at 7. The light must be visible on the outer side of the line 7 over an area of at least 110°, as indicated by the line 8, and the light within an area of approximately 30° between the line 7 and the line 9 must be of such intensity as to impart thereto a long range visibility from a straight ahead position.

In providing a position light, or the fixture therefor, which will have these characteristics, I have made use of a combination of reflectors one of which will reflect the light laterally and forwardly and confine the same to the desired area between lines 7 and 8 and another of which will receive light rays from the lamp and from the reflector, which would not be reflected into the predetermined area, and which will reflect that light forwardly into the area between lines 7 and 9, thereby supplementing the light which is reflected into that area by the first mentioned reflector and imparting to the light in that area the intensity necessary for long range visibility. As here shown, the device as a whole comprises a supporting structure 10 having a base portion 11 by means of which it may be rigidly mounted on the wing tip and also having a hollow part or housing 12, the cavity of which is open at its front end. This open end of the housing or cavity is closed by a translucent closure 13 which is shown as dome-shaped and is usually of red or green glass. In this particular construction the housing 12 is circular in cross section and is provided with a recess 14, the closure 13 has a flange 15 which fits within the recess 14 and a suitable fastening device is provided to retain the closure in position. This fastening device is here shown as a bail latch 16 which is pivoted on the housing at 17 and is sprung over the outer end of the closure to clamp the same tightly onto the housing. The supporting structure is provided with a lamp socket which, in the present instance, is formed in the base and, as shown at 18, is arranged diagonally to the length of the structure with its inner end foremost. This lamp socket is so arranged that it will support the lamp 19 adjacent to the open front end of the housing or cavity 12 and in the arrangement here shown the bulb of the lamp for the most part extends beyond the end of the housing and into the dome-shaped closure 13.

Supported upon this structure is a suitable reflector 20 which is arranged at one side of the lamp 19 and faces laterally toward the opposite side of the lamp. This reflector is of such a character that it will reflect the light rays forwardly and rearwardly, as well as laterally, and it is preferably cup-shaped. Means are provided for confining the light rays from the reflector to an area on the outer side of a fore and aft line

extending through the supporting structure. In the present arrangement the forward edge 21 of the reflector is arranged in such a fore and aft line, here shown as a vertical plane extending through the lamp 19 near the center thereof. Hence the forward portion 21 of the reflector, which is opaque, will intercept the light rays from the lamp which are projected forwardly and toward the wing and none of the light rays can pass to that side of the fore and aft line adjacent to the wing tip. The rear portion of the reflector reflects the light forwardly on the outer side of the fore and aft line and the light rays which are projected rearwardly by the forward portion of the reflector are intercepted by opaque parts of the fixture, the present arrangement being such that the light rays will be confined to an area of approximately 110°. The reflector 20 as here shown is substantially semi-spherical in shape and its edge as a whole lies approximately in said vertical fore and aft plane but it is not essential that the rear portion of this edge should be in that plane.

A second reflector 22 is mounted in the rear of the lamp 19 and has a forwardly facing reflecting surface arranged to receive light rays from the lamp and from the rearwardly facing forward portion of the reflector 20 and to reflect these rays forwardly along the fore and aft line, and for the most part within the area between the lines 7 and 9, so as to supplement the light rays which are reflected into that area by the rear portion of the reflector 20 and thereby intensify the light in that area. This reflector may take various forms but, as here shown, it is circular in form and slightly concave and its circumferential edge is seated against the bottom of the recess 14 in the housing on which it is clamped by the closure 13, a suitable packing 23 being inserted between the edge of the closure and the reflector. As will be apparent this circular reflector extends on opposite sides of the fore and aft line coincident with the edge of the semi-spherical reflector 20 and it is provided in that portion adjacent to the reflector 20 with an opening 24 through which the rear portion of the reflector 20 extends, this portion of the reflector 20 being soldered or otherwise rigidly secured to the reflector 22 so that the reflector 20 is supported in a fixed position by the reflector 22. This opening 24 is adjacent to the inner end of the lamp socket 18 and the reflector 20 has an opening 25 which intersects the opening 24 and is arranged in line with the lamp socket, so that a lamp may be inserted in and removed from that lamp socket.

As will be apparent from the foregoing description the light from the lamp is reflected by the reflector 20 forwardly, laterally and rearwardly and the forward portion of that reflector establishes one lateral limit beyond which the rays of light may not be projected, but, obviously, the light rays may be confined to the desired area by means other than the reflector. The light rays which are projected forwardly toward the inner side of the fore and aft line and which strike the forward portion of the reflector are reflected rearwardly at such an angle that they do not pass through the glass closure and would have no value, but by the use of the second reflector 22 these light rays, as well as direct light rays from the lamp, are reflected forwardly and caused to supplement the other forwardly projected light rays and thereby intensify the light in the forward area of the device and impart thereto a long range visibility. Due to the compounding of the reflectors in the manner described this intensity of the light can be secured from a lamp of relatively small candle power and of relatively small size and the whole device may be made of a small size which will have very little wind resistance or drag. The structure as a whole is very simple and easily manufactured and the parts are readily accessible.

The term "forwardly" as herein used has reference to the direction of the light rays of greatest intensity and not necessarily to the direction of movement of the airplane. Position lights embodying the invention may be used for purposes where the desired long range visibility is from a direction other than straight ahead.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention what I claim as new and desire to secure by Letters Patent, is:

1. A position light comprising a supporting structure having a forwardly opening cavity and provided with a lamp socket, a translucent dome closing the forward end of said cavity and projecting forwardly therefrom, a substantially semi-spherical reflector mounted in said dome and arranged to extend partially about a lamp in said socket with its edge in a fore and aft plane extending through said lamp, and a forwardly facing slightly concave reflector mounted adjacent to the forward end of said cavity and having a part extending transversely to said plane on that side thereof opposite the first mentioned reflector.

2. A position light comprising a supporting structure having a diagonal lamp socket, a forwardly facing transverse reflector mounted on said supporting structure in front of said lamp socket and having an opening adjacent to said socket, a laterally facing cup-shaped reflector arranged in front of said transverse reflector and having a part extending through the opening therein and secured thereto, said cup-shaped reflector having its forward edge in a fore and aft plane extending through a lamp in said socket and through said transverse reflector, and having an opening in line with said opening in said transverse reflector and with said lamp socket.

3. In a position light comprising a supporting structure having a socket for a lamp, a forwardly facing transverse reflector arranged in the rear of a lamp in said socket, a laterally facing cup-shaped reflector arranged to extend about one side of said lamp with its forward edge in a fore and aft plane extending through said lamp and said transverse reflector, and means for securing said reflectors to said supporting structure, said socket being arranged at an acute angle to said fore and aft plane and said reflectors having openings in line with said socket to permit the lamp to be inserted in and removed from said socket.

WARREN G. GRIMES.