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[54] **STROBOSCOPIC ANTI-COLLISION BEACON**
4 Claims, 4 Drawing Figs.

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313/201, 240/12, 240/51.12

[51] Int. Cl. **F21g 3/00**

[50] Field of Search **313/198,**
201; 240/1.2, 1.3, 7.7, 41.35, 51.12, 103 A, 103 B,
103; 340/25

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ABSTRACT: An anticollision stroboscopic aircraft beacon employs an annular flash tube lamp and a circularly continuous reflector. The reflector is divided into separate upper and lower portions. The lower reflector portion is positioned in close proximity to the lamp and forms the ionizing electrode for the lamp. The reflector portions form a parabola in section, and the lamp is located at the focus of the parabola to direct the light outwardly with the most intense portion of the pattern in a horizontal plane covering 360°. A gap or space between the upper and lower portions of the reflector permits light from the back side of the lamp to pass through the gap and contribute to the output intensity on the opposite side.

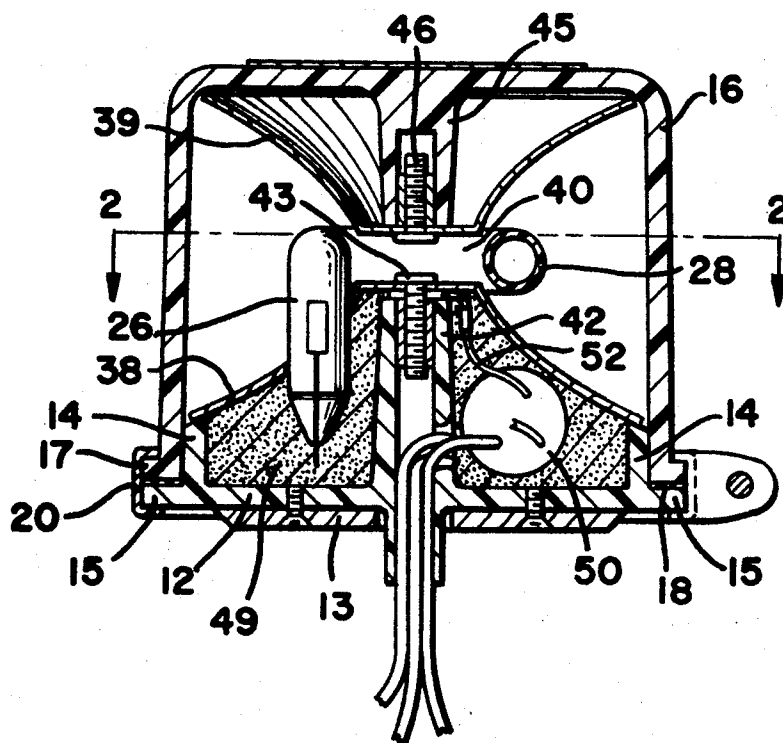


FIG-1

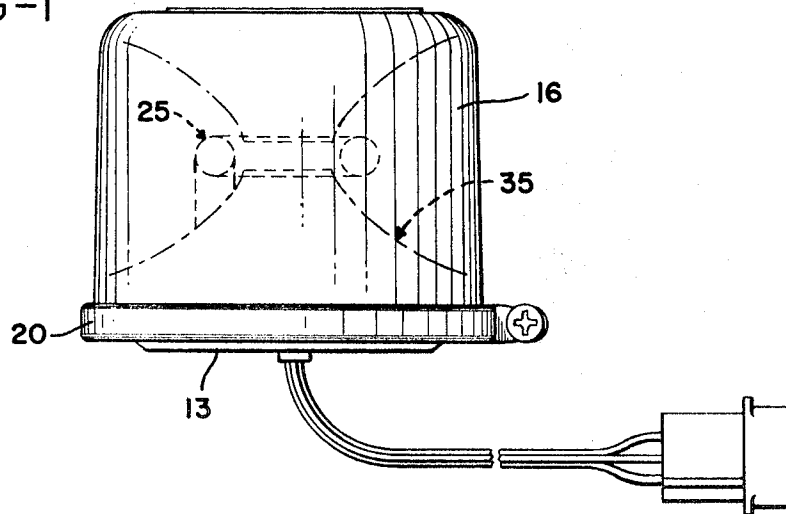


FIG-2

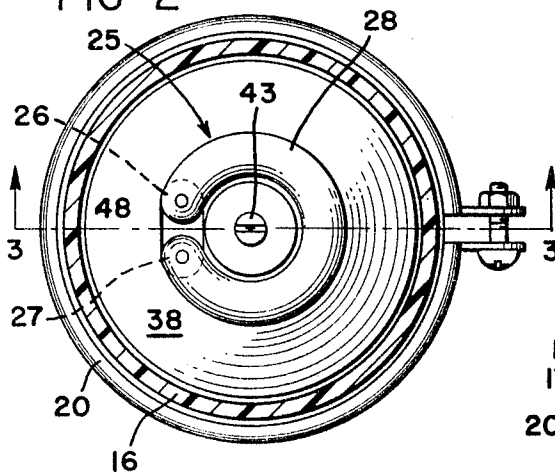


FIG-3

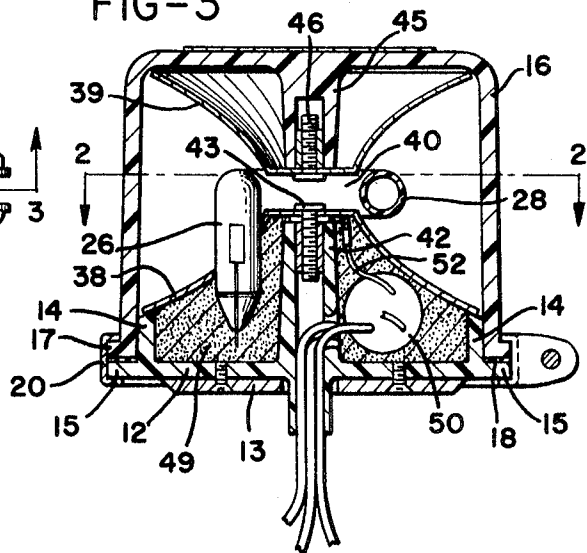
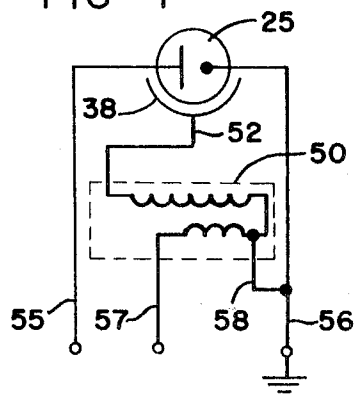


FIG-4



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STROBOSCOPIC ANTI-COLLISION BEACON

BACKGROUND OF THE INVENTION

This invention relates to gas-discharge lights and more particularly to anticollision beacon for aircraft or the like.

Anticollision beacons using high intensity flash tube lamps are coming in widespread use on aircraft due to the superior penetration and visibility of the blue-white xenon flash in conditions of poor visibility, and to the attention arresting characteristic of this flash. Such beacons are used both as a substitute for the present red-colored rotating beacons, where permitted by regulation, and as a secondary beacon in addition to the present equipment.

Frequently, such flash tube beacons employ a glass tube filled with an appropriate low pressure gas, such as xenon, and are formed with three electrodes comprising a pair of internal discharge electrodes at the opposite ends of the tube and an ionizing electrode usually formed as a metallic coating or conductive layer along the outer surface of the tube. In operation, the ionizing electrode is connected to the output of a pulsed autotransformer which causes a momentary high potential to be placed across the tube for ionizing the gas therein and thus initiating the discharge between the internal electrodes which have been previously connected across a charged capacitor. The ionizing electrode, being opaque to the passage of light, tends to reduce the light output of the flash tube lamp to the extent that it covers a portion of the lamp's surface, and contributes to the cost of the lamp.

SUMMARY OF THE INVENTION

The present invention is directed to an improved high intensity gas discharge lamp and assembly therefor including a reflector, in which a portion of the reflector forms the ionizing electrode for the lamp. It has been found that where the surface of a conductive reflector is placed in close proximity to a gas discharge lamp, the reflector may be used as the ionizing electrode for such lamp, thus permitting the elimination of the separately applied electrode to the surface of the lamp. This not only results in a savings of cost in the manufacture of the lamp, but also eliminates the necessity of an additional electrical connection to the lamp itself, and permits the lamp to be made transparent throughout the entire length of the glass envelope, thus increasing its efficiency.

A preferred embodiment of the invention utilizes an annular flash tube lamp which is mounted in surrounding relation to a "capstan" type of reflector. This reflector may define a parabola in cross section, rotated about a vertical axis, with the lamp being positioned at the focus, to provide a well defined high intensity output through 360° in a horizontal plane. However, other reflector and lamp shapes and combinations may be used, and where a circularly continuous reflector is preferred, it may be elliptical, hyperbolic, parabolic or a combination of these.

In the preferred embodiment disclosed herein, the reflector is centrally divided along a horizontal axis to form separate upper and lower sections, with the upper section being retained on the lens and the lower section on the lamp base. The upper and lower sections define a space therebetween less than the height of the lamp but sufficient to permit light to pass therethrough in substantially unrestricted manner, so that light from the back surface of one side of the lamp may pass through the space and contribute to the output intensity at the opposite side of the lamp. In the preferred embodiment the glass envelope of the lamp is contiguous with the lower reflector section which forms the ionizing electrode for the lamp.

It is accordingly an important object of this invention to provide a compact high intensity gas discharge lamp assembly in which a conductive reflector serves not only to direct or control the light but is also the ionizing electrode for the flash tube lamp.

Another object of the invention is the provision of an improved anticollision beacon for aircraft or the like employing

an annular gas discharge lamp formed in surrounding relation to a reflector, which reflector is formed in separate upper and lower sections.

A further object of the invention is the provision of an anticollision beacon in which separate upper and lower sections of a circularly continuous reflector define a gap therebetween and in which an annular flash tube lamp is positioned at such gap.

These and other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of a lamp assembly constructed according to this invention;

FIG. 2 is a horizontal section through the lamp lens taken generally along the line 2-2 of FIG. 3;

FIG. 3 is a vertical section through the lamp assembly taken generally along the line 3-3 of FIG. 2; and

FIG. 4 is an electrical wiring diagram for the lamp assembly.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring to the figures of the drawing, a preferred embodiment of the invention is shown as being embodied in an anticollision beacon for aircraft or the like, such beacon having a base 12 which is adapted to be mounted or applied to the surface or to a fairing of the aircraft, such as by a mounting plate 13. The base 12, as shown in FIG. 3, may be molded or otherwise formed of a nonconductive plastic material, and is formed with an upstanding annular rim 14 on its upper surface and a radially extending flange 15 at its periphery. The beacon lamp further includes a transparent cover or lens 16 which is formed in the shape of an inverted cup and which has a lower flanged lip 17 adapted to be received over the rim 14 and against the upper surface of the flange 15. A suitable gasket 18 may be placed between the parts 15 and 17 which are removably retained in assembled relation by an annularly flanged retainer band 20. Alternately, the parts 15 and 17 may be connected together into a single, throwaway unit.

The beacon lamp assembly of this invention further includes a generally annular gas discharge lamp 25 which is formed with a pair of adjacent depending legs 26 and 27, as shown in FIG. 2, and an encircling main body portion 28. The lamp further includes a reflector indicated generally at 35 in FIG. 1 which is, in its general configuration, formed in the shape of an parabolic surface which has been revolved about a vertical axis, with the main body portion 28 of the lamp 25 being received in encircling relation to the outline of the reflector, as shown in FIG. 1, and being located generally at the loci of focus of the reflector. This general configuration is one which provides high intensity of output from the lamp 25 along a horizontal plane, although, as mentioned above, other reflector shapes may be used with the scope of this invention.

As shown in FIG. 3, the reflector 35 is formed in two sections which includes a lower section 38 and an upper section 39 spaced from the lower section defining therebetween a gap or open space 40 in the region of the lamp body 28. The gap or space 40 is, however, of less vertical extent than the height of the lamp at the body portion 28.

The lower section 38 is electrically isolated from the remaining lamp and adjacent aircraft structure by the base 12, and is retained on an upstanding hollow pedestal 42 formed on the base 12 by a retainer screw 43. The upper section 39 is, in turn, retained on a depending pedestal 45 formed centrally of the lens 16 by a further retaining screw 46. The depending lamp legs 26 and 27 extend through a small elongated opening 48 formed in one side of the lower reflector section 38 and into potting compound 49 formed and received in the space beneath the section 38 and in the wall formed by the flange 14.

It will be seen from an examination of FIG. 3 that the annular body 28 of the lamp 25 is in close proximity to the reflector

section 38 and preferably is annularly contiguous with the upper surface of this reflector section. The reflector section 38 is formed of or includes electrically conductive material, and for this purpose, is preferably made of polished or plated metal. The close proximity of the flash tube 25 to the reflector section 38 provides physical support for the lamp and also functions as the ionizing electrode for the lamp, thereby eliminating the need for any additional electrode in association with the lamp. Accordingly, the glass envelope defining the lamp may be clear throughout its useable length.

A trigger transformer 50 may also be mounted in the potting compound 49 in the space defined between the lower reflector section 38 and the base 12. The output lead 52 from the transformer 50 may be electrically connected to the reflector section 38 by a suitable terminal received under the screw 43. The remaining leads to the lamp 25 and transformer 50 may be conveniently brought out through the center of the hollow stem 42.

In operation of this invention, a suitably charged capacitor, not shown, is electrically connected to the input leads 55 and 56 for the lamp 25, and a trigger pulse is applied to the input leads 57 and 58 for the transformer 50. The short duration, high-intensity pulse from the transformer 50 is applied directly to the reflector section 38 which comprises the ionizing electrode for the lamp 25, thus causing the gas within the lamp to ionize and the capacitor to be discharged through the lamp. The gap 40 defined between the respective upper and lower reflector sections allows light from the back surfaces of the lamp to pass through the gap and through the opposite side of the gap to contribute to the output intensity at the opposite side of the lamp. The lens 16 is preferably formed of clear acrylic or polycarbonate plastic material but may be suitably

tinted, as desired for the particular use of the device.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention.

What we claim is:

1. A stroboscopic anticollision beacon for aircraft or the like comprising a mounting base, an upstanding cup-shaped lens mounted on said base, a capstan-shaped reflector within said lens having an upper half mounted on said lens and a lower half mounted on said base and defining with said upper half a transversely open space therebetween, and a gas discharge lamp encircling said reflector between said upper and lower halves in the region of said open space so that light from the inside surfaces of the lamp is free to pass transversely through said space.

2. The beacon of claim 1 in which said lower reflector half is made of electrically conductive material and is contiguous with said lamp over a substantial extent thereof, and an ionizing circuit for said lamp having an electrical connection with said lower reflector half reflector that said lower reflector half forms the ionizing electrode for said lamp.

3. The beacon of claim 1 in which said lower reflector half defines with said base a closed annular space in which electric circuit components and potting compound may be received.

4. The beacon of claim 1 in which said upper and lower reflector halves define a parabolic surface of revolution in which said lamp is located generally at the loci of focus thereof.

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