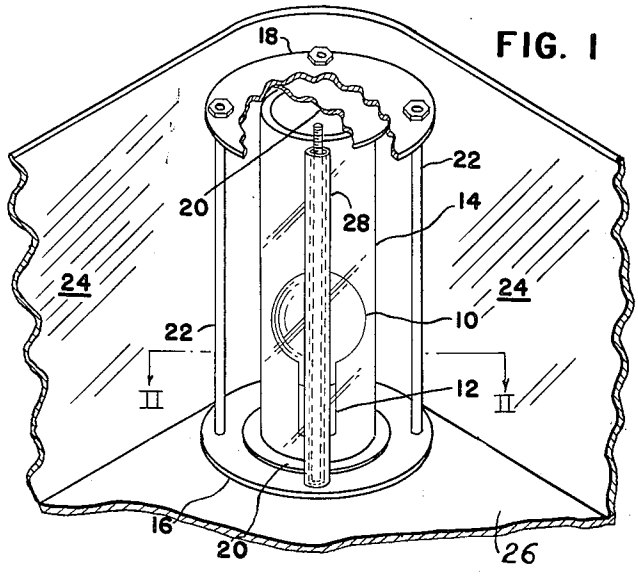
March 27, 1956 J. CARRIE 2,740,038

SHIP'S NAVIGATIONAL LIGHT

Filed Sept. 25, 1952

FIG. 1



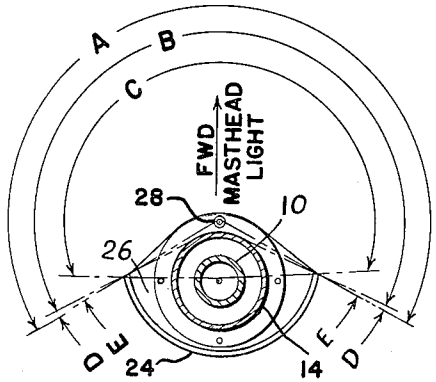
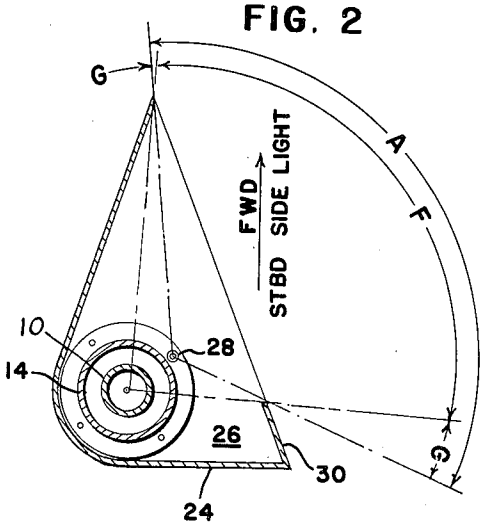


FIG. 4

FIG. 2



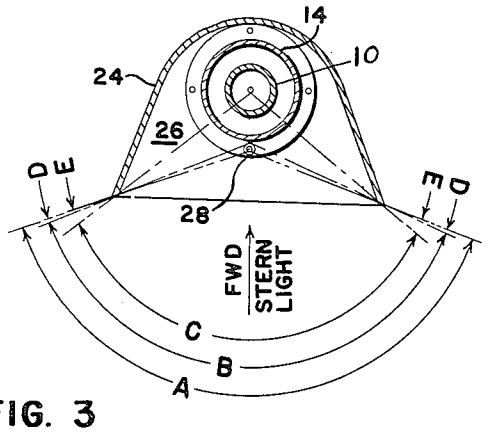


FIG. 3

INVENTOR

JOHN CARRIE

BY

B. L. Zabarill

ATTORNEYS

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SHIP'S NAVIGATIONAL LIGHT

John Carrie, Arlington, Va.

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(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties theron or therefor.

This invention relates to ship's navigational lights and more particularly to running lights used on ships. The type of light fixture disclosed herein utilizes a primary source of light and a highly polished reflecting rod for radiating rays of light in an arc, the angle of which is defined by a pair of screens positioned on the ship.

The characteristics of a ship's navigational lights are controlled by statute, the latter being commonly known as the "International Rules and Regulations for Preventing Collisions at Sea." These rules require that each of the ship's navigational lights provide an arc of light of definite value, color and height, and that they be visible throughout a prescribed distance, depending on where the light is situated on the ship.

The fixtures of the prior art satisfy the above-mentioned requirements in the rules, but with one notable exception, namely, the arc of emitted light of the fixtures of the prior art is not of a definite value. The variance in the value or size of the arc is caused by the relative position of the lens-enclosed lamp or bulb with respect to the screens which are used for confining the arc to a particular sector adjacent the ship.

It is common practice to position the socket for the bulb at the intersection or apex of a pair of planes lying in the face of each of the screens in the fixture. The filament of the bulb is therefore in alignment with the screens and the arc thereby subscribed conforms to the requirements set forth in the rules for this particular fixture. However, in order to obtain watertight integrity, the bulb is enclosed in a lens having a top opening closed by a cap which is held in place by a plurality of tie-rods exterior to the lens. It is evident from this that the outermost part of the lens is closer to the opening formed by the screens than the filament of the bulb; the result being that the arc is actually increased in length, since an observer could move outside of the angle formed by the screens, and although he could not see the filament from this point, the lens and the light radiated therefrom would be clearly visible to him. This situation is aggravated by the fact that the tie rods also radiate light and a tangential glow surrounds the burning light during the hours of darkness.

In order to eliminate the above-described deficiencies, larger, and therefore more expensive, screens have been incorporated in the prior art fixtures, and although this improves the angle of cut-off of light, it fails to solve the problem of having one arc of definite value.

The present invention eliminates the disadvantages set forth above by converting the sole source of light of prior art fixtures into a primary source and introduces a vertical-line secondary light source into the structure. This vertical-line secondary light source takes the form of a mirror-like silvered glass tube positioned outward of the primary light source for reflecting the light in such a fashion that

an unvarying and accurate cut-off angle is achieved. This vertical-like secondary source can be designated, for convenience, as a reflector.

It is therefore an object of the invention to provide a new and efficient ship's navigational light.

A further object is the provision of a light covering a prescribed arc of visibility over a varying range of distance.

Another object of the invention is the provision of a light having short screens thereby resulting in a smaller, lighter and less costlier fixture.

A still further object is the addition of a reflecting rod for clearly establishing the cut-off angle of light emitted by the light source.

With these and other objects in view, as will hereinafter more fully appear, and which will be more particularly pointed out in the appended claims, reference is now made to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a perspective view of a ship's navigational light embodying the principles of the invention, the light being adapted to receive a suitable screen according to the particular location of the light on a ship;

Figure 2 is a sectional view taken on lines II—II of Figure 1, showing a screen adapting the light for use as a starboard side light;

Figure 3 is a sectional view similar to Figure 2, but having a screen adapting the light for use as a stern light; and

Figure 4 is a sectional view similar to Figure 2, but having a screen adapting the light for use as a masthead light.

Referring now to the drawing, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Figure 1 a running light comprising a lamp **10** threaded into a socket **12**. The means for supplying power to this bulb comprises electrical conductors extending from a suitable source of power located in the ship. Surrounding the bulb is a colored or transparent or translucent lens **14** mounted vertically between a metal base **16** and a cap **18** each of which is provided with rubber gaskets **20** thereby providing a water-tight seal at the ends of the cylindrical lens. In order to secure the water-tight seal integrity as well as to hold the entire assembly together, brass tie rods **22** external to the lens are used to clamp the cap, lens and base of the fixture into a complete unit. This lamp assembly is adapted to be situated within metal screens **24**. These screens are usually made of two parts, but may be integral, as shown in this drawing. The screen is shaped as shown; and the surface of the screen facing the lamp are generally painted of the same color as the translucent shade or lens which encloses the lamp **10**. A metal supporting plate **26** is welded or otherwise secured to a part of the ship's structure for supporting the lamp hereinabove described.

An important feature of the invention is the positioning of a reflecting tube or rod **28** around one of the brass tie-rods **22** as a secondary source of light. This reflecting tube or reflector **28** is internally silvered so as to create a mirror-like surface for reflecting light from lamp **10**. As shown in these figures, the tie-rod **22** which accommodates the reflecting tube **28** is situated forwardly of the lamp **10** and is accurately placed in position so as to achieve a proper light cut-off at the ends of each of the screens. In general, as is apparent from Figs. 2, 3 and 4, the tube **28** lies slightly outward of a line extending from the edge of the screen and substantially tangent to the lens **14**. As shown in each of Figures 2, 3 and 4 the metal screens **24** are properly arranged with respect to the lamp assembly for light cut-off, and may be formed as smooth curves, as shown in Figs. 3 and 4, and may have

added cut-off portions as shown in the screen of Figure 2 where a projecting portion **30** is shown for achieving a proper cut-off of light at an angle that is required for the particular running light on the ship.

In Figures 2, 3 and 4 the arcs represented by characters A through G show the various angles of light, direct and reflected, that are made by the fixtures, direct light being indicated by alternating relatively short and long lines, and reflected light by relatively long lines alternating with pairs of short lines. An analysis of these angles and the arcs subtended thereby, will show a strict compliance with the Rules since the angle of light emitted from each fixture is of definite value which results from a sharp cutoff of light. A chart of the various angles and ranges is as follows:

In all figures, A represents the correct angle of light, both direct and reflected, visible throughout the prescribed range from the ship. The fixture is designed with this angle and satisfies the International Rules mentioned above.

In Figures 3 and 4, the angles are:

B—Maximum angle of light emitted from the primary source, including the bulb **10** and lens **14**.

C—Angle of direct light visible to the horizon.

D—Non-overlapping angles of light reflected solely by the reflector comprising the tube **28**.

E—Angles of direct and reflected light which add to C to result in angle A.

With respect to Fig. 2 the angles are:

F—Angle of direct light visible to the horizon.

G—Angles of direct and reflected light that add to F to result in angle A.

Prior investigations have shown that in navigational lamp fixtures of the prior art, that is, a fixture not utilizing a reflecting rod, an observer positioned within 1000 yards of the light source could actually see the light even though he was outside of the angle or arc which the fixture was designed to encompass. This occurred because light was reflected from the brass tie-rod immediately in front or outward of the fixture, and also, because the tangential glow from the lens was of sufficient intensity within this 1000 yard range to give the appearance of an actual lamp. However, as the observer moved away from the fixture, thereby increasing the distance from the light source, the reflection from the tie-rod in the forward part of the lens, and the tangential glow, was not of sufficient intensity to be discernable at greater ranges. In order to see the light, it was then necessary to move within the angle defined by the screens where the lens could be observed. Therefore, the error of arc visibility created by the prior art fixtures is such that it is greater where the error should be the least, that is, at short ranges.

In night operations of ships at sea, the navigational lights are relied on as the sole source for determining the true bearing of one ship from another and thereby roughly determining, when additional navigational aids are not used, the course the various vessels are steering. It is believed obvious that the importance of light fixtures, truly showing the arc of light for which they were designed, might very well determine the safety of the ship when operating during darkness.

The fixture itself has been subordinated to a position well inside the screen where it functions as a primary light source for distributing rays of light over the major and central portion of the arc. The primary light source also serves to illuminate the vertical-line reflector, and this reflector directs light rays past the edges of the screens into that portion of the arc that is not covered by light direct from the primary source. These light rays from

the secondary source are always in predetermined relation relative to the edges of the screens, because of the accuracy with which the single tube **28** can be repeatedly placed in the fixture. Its position inside the screen is such, however, that it can in no way influence the cut-off angles which determine the boundaries and hence the size of the arc. This important function is controlled entirely by the vertical-line reflecting rod which is placed at the critical position formerly occupied by the lamp. Since it presents a vertical-line of light of unvarying width, it creates a cut-off angle at each end of the arc of visibility and the value of this angle is controlled by the proper design of the screens.

This invention eliminates the errors inherent in prior navigational lamp fixtures and assures the emission of an arc of light of proper value in addition to being reliable and accurate.

Various modifications are contemplated and may obviously be resorted to by others skilled in the art without departing from the spirit, and scope of the invention, as hereinafter defined by the appended claims, as only a preferred embodiment thereof has been disclosed.

What is claimed is:

1. In a navigational lamp fixture comprising a lamp socket, a lamp in said socket, a translucent lens enclosing said lamp, base and cap means respectively positioned on each end of said lens thereby forming a water-tight unit, a plurality of tie-rods exterior to said lens securing said base to said cap, an open screen having a predetermined opening therein mounted adjacent said lamp fixture and reflecting means mounted on a tie rod outward of said lens and away from said screen for reflecting light rays toward the ends of an arc defined by the opening of said screen, said reflecting means comprising a hollow glass rod having an internally silvered surface forming a mirror like finish on said rod.

2. A navigational lamp fixture for providing a substantially constant prescribed arc of visibility over a prescribed range of distances comprising, a screen having angularly disposed panels of predetermined dimensions in the direction of said prescribed arc integral at one end and open at the opposite ends, said opening defining a predetermined arc, a light source mounted adjacent the vertex and along the bisector of the angle formed by said panels, and a substantially vertical-line reflector mounted adjacent said vertex along said bisector, outward of said light source and away from said screen for directing light toward the open ends of said screen to define said prescribed arc of visibility, the dimension of said panels from said vertex to said open ends for said prescribed arc being determined by the position of said reflector.

3. The combination according to claim 2 wherein said light source comprises a lamp, a translucent lens enclosing said lamp, base and cap means respectively positioned on each end of said lens, and a plurality of tie rods exterior to said lens securing said base to said cap, thereby forming a watertight unit.

4. The combination according to claim 3 wherein said vertical-line reflector comprises a highly polished hollow rod mounted on one of said tie rods.

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