Feb. 19, 1935. J. H. KURLANDER 1,991,753

FLASH LAMP

Filed Dec. 17, 1932 2 Sheets-Sheet 1

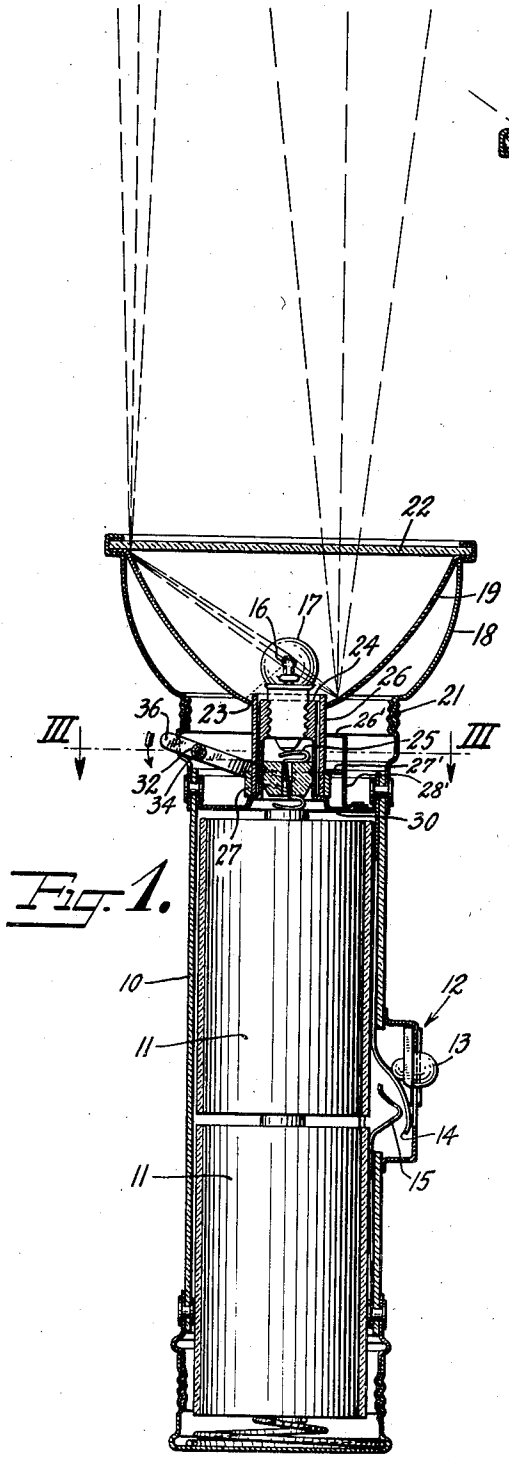


Fig. 1.

Fig. 2.

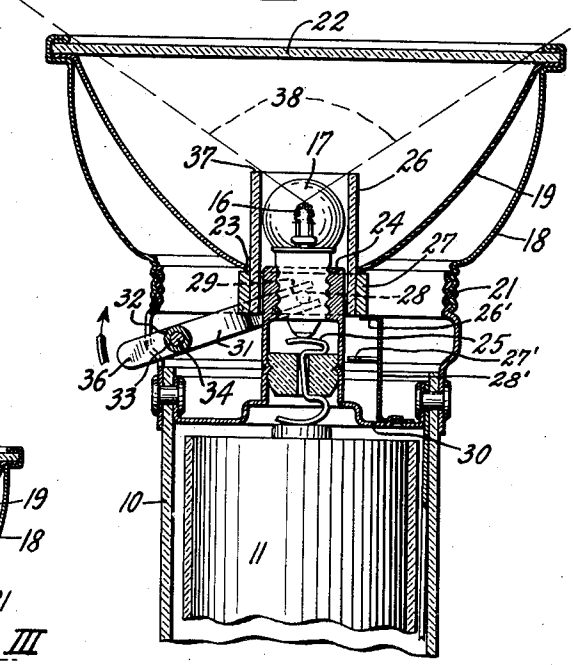
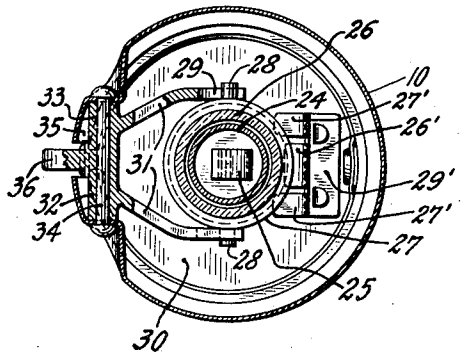


Fig. 3.



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Fig. 7.

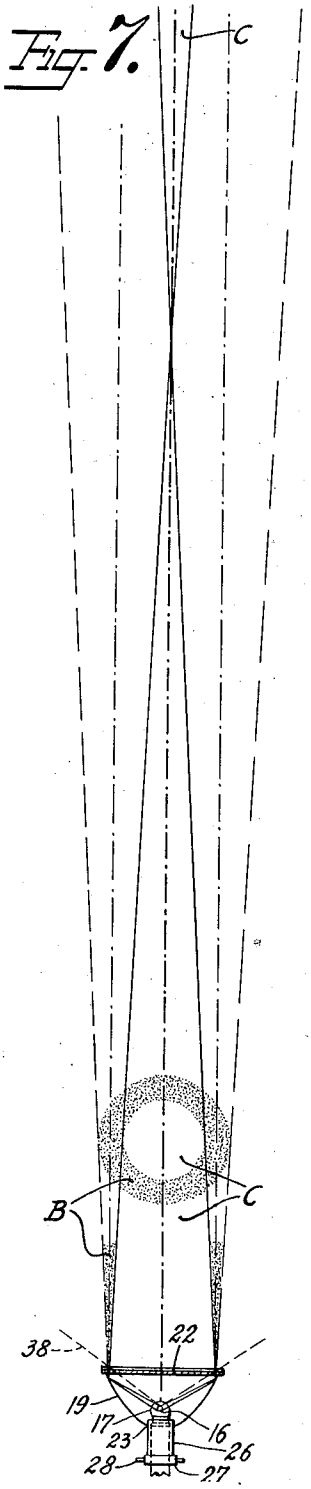


Fig. 4.

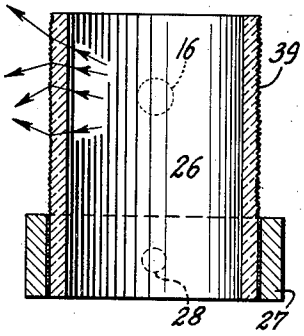


Fig. 5.

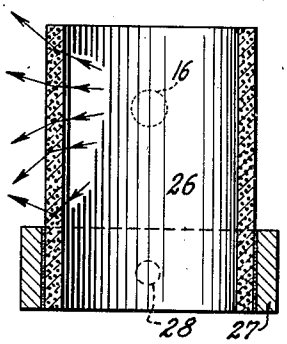


Fig. 6.

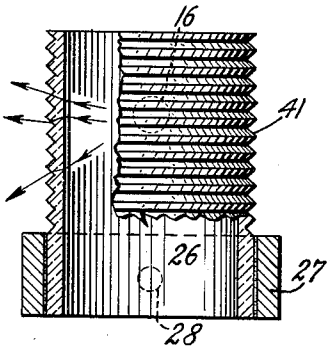


Fig. 9.

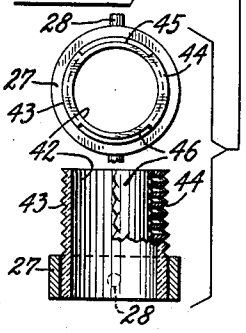


Fig. 8.

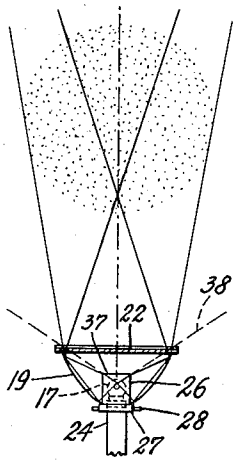
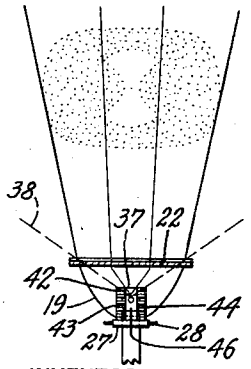


Fig. 10.



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UNITED STATES PATENT OFFICE

1,991,753

FLASH LAMP

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Application December 17, 1932, Serial No. 647,738

3 Claims. (Cl. 240—10.69)

This invention relates to portable lamps and relates more particularly to flash lamps such as a lantern or torch employing an incandescent electric lamp.

Flashlamps as commonly employed include a casing to hold a battery such as a dry cell, a socket for an incandescent electric lamp bulb and a reflector for projecting a beam of light. Although flashlamps from which concentrated beams of light are projected are satisfactory for general use, it is desirable to so construct a lamp that the concentrated beam of light may be converted to diffused light and vice versa.

For the purpose of providing the desired change in the character of the reflected light, it has been proposed to employ a concave reflector with a source of light disposed at the focal point and to provide means for changing the relative positions of the reflector and the light source to vary the spread of the beam. This expedient makes it possible to produce a concentrated beam or spot of light where the light source is properly focused with respect to the reflector and a somewhat wider spread of light when the light source is out of focus.

When utilizing a construction wherein the wide spread of beam is produced by a light source out of focus with the reflector the maximum diameter of the beam produced is limited to twice the diameter of the smallest beam obtainable with the particular arrangement employed. The range obtained is not, however, sufficient to meet practical requirements of illumination for the purpose intended.

Furthermore, when a wide spread of beam is obtained by distorting the focal point the distribution of light is irregular and results in light and dark areas. These areas, as is well known in connection with the reflection of light, include a dark spot surrounded by an illuminated annulus.

When using a portable flashlamp it is essential to provide a concentrated spot or projected concentrated beam of light for illuminating distant objects. It is also desirable to be able to change the character of the beam to obtain a wide spread or flood light. For example, when it is desirable to use the lamp to illuminate a room or when the lamp is in the form of a hand lantern to use the light for general purposes, such as reading, an even distribution of uniform light is required. The presence of dark areas and irregularities in the distribution of light is not only a disadvantage but makes the use of such a lamp inefficient.

It is an object of the present invention to provide a flashlamp device for projecting a concentrated beam of light and for converting the beam into a flood of evenly distributed light.

Another object of the invention is to reflect light in the form of a concentrated beam from a suitably positioned light source and to change the concentrated beam of light into a widely distributed beam in the absence of dark spots.

Another object of the invention is to project a concentrated beam of light from a light source of relatively small area and in providing a secondary light source of relatively large area to project a widely distributed beam of light.

Other objects and advantages of the invention will be understood from the following description together with the accompanying drawings in which:

Fig. 1 is a cross sectional view of a flashlamp or torch constructed in accordance with the present invention for the projection of a concentrated beam of light and for a widely distributed light-beam;

Fig. 2 is an enlarged fragmentary view showing the operative elements for changing the character of the light-beam;

Fig. 3 is a view taken on line III—III in Fig. 1;

Fig. 4 is a cross sectional view of a cylindrical element movable over the light source to provide a secondary light source of large area, the cylinder having its outer surface roughened to diffuse the light rays;

Fig. 5 is a view similar to Fig. 4 but indicating a translucent cylinder composed of material which diverts the light rays when passing therethrough;

Fig. 6 is a view of a cylinder similar to that shown in Fig. 4 but showing an exterior serrated surface;

Fig. 7 is a diagrammatic view showing a beam of light projected from a light source by means of a reflector;

Fig. 8 is a view similar to Fig. 7 but shows the light source surrounded by a light diffusing element to provide a source of light of large area to give a flood or wide spread beam of light;

Fig. 9 is a top and side view of a light-diffusing element having segmental portions of its area provided with light-diffusing surfaces; and

Fig. 10 is a diagrammatic view of a reflector and light source with the cylinder shown in Fig. 9 disposed around the light source.

It is well known that various constructions have been proposed in connection with lighting units whereby the character of the reflected light is changed. For example, in automobile headlight

lamps it has been proposed to provide means for projecting the beam of light and to provide means for dimming the light or otherwise preventing the light from being projected in a concentrated beam. In such cases, however, the result sought was to dim the light and not to provide a device in which a beam of light could be used for the illumination of distant objects and in which diffused light could be made useful for the illumination of relatively close objects so that the device was capable of serving as a so-called search lamp and as a general utility lamp.

Such an object has not been sought in previous devices and is attained in the present invention by providing an element movable between the light source and a reflector which element has the property of diffusing light from the source and serving as a secondary light source of relatively large area for the transmission of light to the reflector for distribution at a wide angle in a uniform manner and without the occurrence of dark spots.

In a device of the character to which the present invention relates it is essential to provide a light-diffusing element which may be conveniently and quickly actuated for the purpose intended.

As shown in the accompanying drawings, a practical embodiment of the invention may comprise a casing 10 to receive batteries 11 in the form of dry cells such as are generally employed as the source of electrical energy for flash-lamps. The casing is provided with a switch 12 of any suitable construction and in the present case shows a slidable element 13 for moving a resilient contact 14 against a contact 15 to close the circuit in which a filament 16 of an incandescent lamp 17 is included.

The casing is provided with a holder 18 to support a concave reflector 19. The holder 18 is threadedly secured at 21 with the casing 10. A cover glass or lens 22 is provided and the concave reflector 19 has a central aperture 23 and is supported in the holder 18 between the lens and a peripheral flange on the reflector. Any suitable construction may be employed, as means for holding the reflector may vary with different devices.

A socket 24 is disposed on the principal focal axis of the reflector so that when the lamp 17 is positioned to make electrical engagement with a contact 25 the filament 16 may be disposed on the focal point of the reflector so as to send out an annular ring of reflected light B, as indicated in Fig. 7, which results in a beam C of high intensity.

The lamp as so far described gives the usual desirable spot of light for illuminating distant objects and it may be used as a so-called searchlight.

For the purpose of converting the concentrated beam of light into widely dispersed or diffused light, the present invention provides a movable element 26 preferably in the form of a translucent sleeve or cylinder. This cylinder may be mounted in any suitable manner to slide forward to surround the lamp 17 or backward to be removed therefrom. For this purpose the present construction provides the cylinder with a collar 27 having pins 28 disposed in slots 29 in arms 31 of a rocker member 32.

The rocker member is provided with a bearing 33 to receive a shaft 34 suitably supported in a pocket 35 formed in the casing 10. The rocker member 32 is provided with a finger piece 36. A movement of the finger piece serves to rock the arms 31 with the shaft 34 as a fulcrum and thereby moves the cylinder or element 26 to or from its position around the lamp. For the purpose of holding the light-diffusing element 26 in its outer position, a spring tongue 26′ is provided and the element is held in its inner position by a pair of spring tongues 27′. These retainer tongues are formed integral with a sheet metal support 28′ having a foot 29′ secured to partition 30 which also supports the socket 24.

When the light-diffusing element is in its forward position as shown in Fig. 2, its outer perimeter 37 is disposed so as to intersect a line 38 drawn from the light source to the outer edge of the reflector. When so positioned, the light to be reflected will pass through the element 26 and, as shown in Fig. 8, the element 26 serves as a secondary light source and, by reason of the diffusion of the light before it reaches the reflector, the reflected light will give a wide beam of even intensity without producing any dark spots.

The light-diffusing element 26 may be of transparent material made translucent by having either the inner or the outer surface rendered light-diffusing. As shown in Fig. 4, the outer surface 39 is roughened either by sand-blasting or by etching or it may be coated with a light-diffusing material. The element 26 may, however, be made of translucent material as shown in Fig. 5 wherein the light-diffusing property is within the glass itself so that the rays of light are broken up as they pass through the glass. It has also been found that element 26 may be provided with serrations 41, as shown in Fig. 6, so as to break up the light coming from the light source and provide a secondary light source of widely scattered rays.

If desirable a combination of diffused light and direct light may be obtained by making the secondary light source in the form of a cylinder 42 as shown in Fig. 9. In this case roughened or serrated surfaces 43 and 44 may be provided in the form of segmental surfaces on the cylinder, leaving portions 45 and 46 clear, or the portions 45 and 46 may be removed leaving openings for the passage of direct light rays to be reflected. With this construction an elongated beam of light of even intensity will be produced having a central portion of greater intensity so that the result attained will serve to provide immediate illumination and a substantial amount of projected light for distant objects. A lamp of this character is desirable for use at night when a certain amount of useful illumination is desired on the ground or in the immediate vicinity of the device which projects the spot or beam of light.

Although the present invention is shown as applied to a torch hand lamp of cylindrical form it is to be understood that the invention is equally applicable to lamps of the lantern or box type which may be used while being carried and which also may be used as a stationary or table lamp.

It is possible, by reason of the present construction, to vary the spread of the diffused light by moving the light-diffusing element to any intermediate position so as to partially enclose the bulb permitting only a given portion of the reflector to be affected. This results in the formation of a combination of a central spot of high intensity and a wide flood of light of low intensity. The ratio of spot intensity to the flood intensity can be varied at will by adjusting the position of the light-diffusing element.

It will be appreciated that by reason of the present invention the filament of a lamp which is of relatively small area and of high light intensity may be quickly and conveniently converted to what may be termed a secondary light source of relatively large area and low intensity so that the light reflected from the primary light source will give a concentrated beam of light and the interposed light-diffusing element causes diffused light to be reflected with relatively small loss and wide distribution. The light-diffusing element may be of any translucent material which will break up the light rays and by translucent is meant a highly light-diffusing material having the property of diverting light rays as by reflecting them from irregular particles within the light-diffusing material or by reason of irregularities on the surface of the material as distinguished from transparent or colored material through which the light travels in substantially a straight path. The translucency of the light-diffusing element must be such that the concentrated or spot of light as found in the filament is removed and replaced by a widely diffused source of light.

Flash lamps are widely used under varying conditions and, although such lamps as heretofore made serve their purpose, they do not approach the ideal condition in which all the light is effectively utilized. In the present construction the ideal condition is more nearly reached and, as will be evident when the light-diffusing sleeve is in position to provide a source of secondary diffused light, it is also so disposed that no waste of light will occur and only light rays that are within the bounds of the reflector are diffused.

The degree of movement of the sleeve is regulated and this movement is so limited that the outer edge of the sleeve, when in its operative position, lies in a plane dividing the diffused light from the direct light. If the sleeve is extended appreciably beyond the predetermined position or intercepts the light rays striking the outer edge of the reflector a ring of light in the form of what may be termed a light shadow will appear.

On the other hand, by controlling the movement of the sleeve so as to determine its operative position, it is possible to obtain the benefit of the maximum amount of direct light which blends or merges with the diffused light without any visible dark ring or line of demarcation between the direct and the diffused light. This gives an even distribution of light for reading or other use as in the general illumination of a room. The position of the sleeve to permit the reflection of all the direct light is also important and when the sleeve is retracted it is moved to uncover the primary light source and its distance of travel toward the reflector is determined by a straight line (indicated by a dotted line in Fig. 1) drawn from the rearmost portion of the light source to the edge of the central aperture in the reflector so that no light will be diffused by the sleeve.

By reason of the present invention the usefulness of a flashlamp such as a torch or lantern is increased and, whereas heretofore only a spot light or an inefficient spread of light having a dark spot was possible, the present invention provides a device wherein a concentrated spot of light for illuminating distant objects is obtainable and wherein such light is quickly and conveniently convertible into a flood of light of uniform intensity.

Although a preferred embodiment of the invention is shown and described herein, it is to be understood that modification may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. In a flash lamp the combination of a battery casing, a bulb having a filament therein, a reflector extending from the neck portion of said bulb, a lamp receiving socket mounted in said casing to hold said bulb with said filament substantially on the focal line of said reflector for the projection of a spot of light, a sleeve made of highly light-diffusing material movable between said reflector and filament to divert the light rays emanating from said filament to produce a flood of diffused light for illumination.

2. In a flash lamp the combination of a battery casing, a bulb having a filament therein, a reflector extending from the neck portion of said bulb, a lamp receiving socket mounted in said casing to hold said bulb with said filament substantially on the focal line of said reflector for the projection of a spot of light, a sleeve made of highly light-diffusing material movable between said reflector and filament to divert the light rays emanating from said filament to produce a flood of diffused light for illumination and means for operating said sleeve.

3. In a flash lamp the combination of a battery casing, a bulb having a filament therein, a reflector extending from the neck portion of said bulb, a lamp receiving socket mounted in said casing to hold said bulb with said filament substantially on the focal line of said reflector for the projection of a spot of light, a sleeve made of highly light-diffusing material, means for moving said sleeve to enclose said lamp, and means for limiting the movement of said sleeve to position the outer edge thereof substantially in the path of light rays striking the outer edge of said reflector to produce a substantially uniform flood of light.

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