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CHANGEABLE MULTICOLORED FLASHLIGHT

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Our invention relates to electric flashlights and has reference more particularly to a compact and light construction thereof that is adaptable to effect changes in the color of the light emitted to enable use of the flashlight for various purposes as, for instance, illumination and signalling.

This application is a continuation in part of our co-pending patent application Serial No. 317,538, filed October 29, 1952, for Flash and Signalling Lights which discloses a flash and signalling light the color of which can readily be altered by means of two movable tubular colored light filters or color-selective light-transmitting members having different diameters.

It is one object of this invention to provide a flash and signalling light which precludes the emission of white light into space upon interposing of a tubular light filter between an incandescent lamp and a coaxially arranged concave reflector surrounding the incandescent lamp.

Another object of the invention is to provide a flash and signalling light of the type comprising an incandescent lamp, a coaxially arranged concave reflector surrounding the incandescent lamp and a tubular colored light filter movable along the axis of the incandescent lamp into, or out of, the path of the beams of light emitted therefrom with a means which causes colored light emitted into space to be highly saturated rather than desaturated, or of a whitish character, resulting from admixture of white light to the filtered colored light.

Another object of the invention is to provide a changeable flashlight or torch comprising an opaque screen attachment for precluding admixture of white light to the colored light produced by passing white light through a color filter, which screen attachment does not call for small manufacturing tolerances, lends itself to mass production methods and casts a very small penumbra, or shadow region.

The foregoing and other objects and advantages of our invention will appear more clearly from the ensuing particular description thereof, as illustrated in the accompanying drawings wherein:

Fig. 1 is in part a vertical section through, and in part a front elevation of, a flash and signalling light made in accordance with this invention, one of the two light filters with which the light is provided being in forward position to filter the light emitted from an incandescent lamp;

Fig. 2 is a view similar to that of Fig. 1 with the other of the two light filters with which the lamp is provided in the forward position to filter another band of light out of the substantially white light emitted from an incandescent lamp;

Fig. 3 shows the same structure as Figs. 1 and 2, both light filters being in retracted position out of the paths of the light rays emitted from the incandescent lamp and reflected from the surrounding reflector into space;

Fig. 4 is a sectional view of a first modification of the structure shown in Figs. 1 to 3, inclusive; and

Fig. 5 is a sectional view of a second modification of the structure shown in Figs. 1 to 3, inclusive.

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Referring now to Figs. 1 to 3, inclusive, reference sign *a* has been applied to a housing or casing having a flaring or bell-shaped end *b*. The concave reflector 5 is inserted into the flaring portion *b* of housing *a*. The incandescent lamp 2 is arranged at the axially outer end of a tubular lead duct *c* within housing *a*. Reflector 5 is provided with an aperture or passage *d* arranged coaxially with regard to lamp 2 and lead duct *c*. A colored tubular light filter or color-selective light-transmitting member 1 is arranged in coaxial relation with regard to lead duct *c*. The diameter of filter 1 is slightly larger than that of lead duct *c* and the former surrounds the latter. Aperture *d* is sufficiently large to provide sufficient clearance between reflector 5 and lead duct *c* to permit moving of filter 1 into and out of the space situated between lamp 2 and reflector 5. Filter 1 has a support *e* at the axially lower end thereof which may form an integral part of filter 1. A slide *g* is provided to manually operate filter 1. To this end the horizontal arm *g'* of slide *g* is attached to support *e* of filter 1, whereas the vertical arm of slide *g* rests against housing *a* and is provided with an operating knob *h* supported by a pin or rivet *i*. Housing *a* has a lateral slot *k* extending in a direction longitudinally thereof and pin or rivet *i* passes through slot *k*. The axially outer i. e. the flaring or light-emitting end of reflector 5 may be closed by a transparent plate of glass *m* or a similarly shaped sheet of a colorless transparent plastic material.

Reference numeral 7 has been applied to a tubular light filter or color-selective light-transmitting member arranged in coaxial relation with regard to lead duct *c*, reflector 5 and filter 1. The radially outer filter 7 may be green and the radially inner filter red. Filter 7 is provided with a support *e'* projecting radially outwardly in the same fashion as support *e* is projecting from filter 1. A slide 8 is attached to support *e'* to manually operate filter 7. To this end the horizontal arm *g''* of slide 8 is attached to support *e'* of filter 7, whereas the vertical arm of slide 8 rests against housing *a* and is provided with an operating knob *h'* supported by a pin or rivet *i'*. Housing *a* has a lateral slot *k'* extending in a direction longitudinally thereof and pin *i'* passes through slot *k'*. The radially outer filter 7 is provided with a square cut-out portion 7' extending from the axially inner edge of filter 7 in a direction longitudinally thereof. The support *e* of filter 1 projects radially through cut-out portion 7' in filter 7.

In Fig. 1 the radially outer or green filter 7 is shown in retracted position and the radially inner or red filter 1 in the forward position.

Cover *m* of reflector 5 is provided with a recess 10 which is circular and has an internal diameter slightly exceeding the outer diameters of both filters 1 and 7. A substantially opaque disc or insert 11 is provided at the bottom of recess 10. Disc or insert 11 covers the end of the colored tubular light filters 1 and 7 when either of them is moved to the respective forward position thereof, and suppresses the substantially axial component of white light of lamp 2 tending to dilute or desaturate the colored light which has passed through either of filters 1 and 7 and is being reflected into space by reflector 5.

It will be apparent from the foregoing that operating knobs *h* and *h'* permit to move either of the two filters 1 and 7 in the active or forward position thereof shown in Fig. 1 and Fig. 2, respectively, wherein the light emitted is colored and of a high degree of color saturation. Operating knobs *h* and *h'* permit to retract filters 1 and 7 to their inactive or rear position shown in Fig. 3 wherein white light is freely emitted from lamp 2 upon reflector 5 and thence reflected into space.

It will be apparent from the foregoing that each of the color-selective light-transmitting tubular members 1,

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7 can be shifted axially outwardly until the axially outer end or edge thereof is situated substantially in the plane of lens *m* and disc or overlay 11. This is due to the relative length of the stroke of slides *g* and 8 and the length of filters 1 and 7 compared to the height of concave reflector 5 at the apex portion thereof.

The structures shown in Figs. 4 and 5 are supposed to have the same operating mechanism for the filters 1 and 7 as those shown in Figs. 1 to 3.

According to Fig. 4 lead duct *c*, incandescent lamp 2, flaring reflector 5 and housing *a* are arranged in coaxial relation and the flaring or light-emitting end of reflector 5 is closed by a transparent cover or lens *m*. A two arm spider structure 23, 24 arranged in back of cover *m* supports an opaque element 21—a disc or a cap—to preclude the light rays of lamp 2 emitted substantially in axial direction and not passing through filter 1 and 7 from being radiated into space.

In Fig. 5 the spider supported light obstruction or impediment element 21 of Fig. 4 has been substituted by an opaque cap 26, fitted into an appropriate recess 27 in the transparent cover plate or lens *m* for the reflector 5.

It will be apparent from the foregoing that the two light filters or color-selective light-transmitting members 1 and 7 are frameless and self-supporting. Parts 1 and 7 including their supporting and operating arms *e* and *e'* may consist of a suitable transparent plastic material. This self-supporting feature tends to substantially reduce the cost of manufacture.

It will also be noted that the opaque light-obstructing means or screen limited to the center area of lens *m* is fixedly combined with the lens *m* and arranged in substantially spaced relation from the electric incandescent lamp 2. All the constituent parts of the opaque light-obstructing screen—such as the spider structure 23, 24 shown in Fig. 4, or the cap 26 with its protruding rim as shown in Fig. 5—are situated immediately adjacent to the plane of, or defined by, lens *m*. The opaque screen may vary in diameter within relatively wide limits without affecting the operativeness of the color changing means as long as the inner diameter of the opaque screen exceeds the outer diameter of filters 1 and 7, respectively. When filters 1 and 7 are in their respective outward position engaging with their axially outer end the filter-receiving recess of the opaque screen structure, the respective filter is supported on both ends rather than on one end only. This latter feature tends to increase the dimensional stability of the filter structures and makes it possible to make the filters 1 and 7, including the supporting and operating arms *e* and *e'* thereof, of a plastic material which has but a relatively limited mechanical strength. The feature of lateral support on the axially outer ends of the filters 1 and 7 is common to all three embodiments of the invention disclosed as will become apparent from a comparison of the structures shown in Figs. 1 to 5, inclusive. The spatial limitation of the penumbra region resulting from the presence of the opaque light-obstructing screen structure is limited to a relatively small acute solid angle since the distance between incandescent lamp 2 and the aforementioned opaque screen structure is reduced to the largest permissible distance.

While it is generally preferable to provide two filters having different colors, it may be sufficient in certain instances to provide one single filter, permitting merely a change between white light and an additional color resulting from subtracting certain bands of wave lengths from the white light emitted from the incandescent lamp.

While slides and manually operable push knobs have been shown in Figs. 1 to 3 as operating mechanisms for the filter or filters, it will be obvious to anyone skilled in the art that other equivalent operating mechanisms may be used instead of the particular operating mechanisms

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shown. It will also be understood that the term flash light is intended to designate any source of substantially white light reflected from a concave reflector, irrespective of the intensity of the light, including lights of search light intensity. Conversely, the term signalling light designates any light other than white, whether intended for signalling or related purposes calling for a colored light, e. g. a yellow fog light.

It will be further understood that by illustrating herein several preferred forms of flash and signalling lights, we do not intend to limit our invention thereto. It will be apparent to anyone skilled in the art that the structures described and illustrated herein are merely specific—though preferred—embodiments of our invention and that the same may take forms other than specifically shown and described herein. It will readily be seen that various changes and modifications may be made without departing from the spirit of the invention or from the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. A flashlight comprising in combination a casing, a concave reflector arranged at one end of said casing, an electric lamp arranged within said reflector, a lens closing the light-emitting end of said reflector, a substantially cup-shaped structure forming an integral part of said lens arranged in substantially spaced fixed relation from said lamp with all the constituent parts thereof situated immediately adjacent to the plane of said lens, said cup-shaped structure comprising a screen having an opaque portion limited to the center area of said lens, and a color-selective light-transmitting tubular member arranged in coaxial relation to said reflector and said lamp and adapted to be shifted in a direction longitudinally thereof from an inactive position to a position wherein the axially outer edge thereof is situated within said cup-shaped structure.

2. A flashlight comprising in combination a casing, a concave reflector arranged at one end of said casing, an electric lamp arranged within said reflector, a lens closing the wide end of said reflector having a recess in the inner surface thereof arranged in coaxial relation to said lamp and limited to the center area of said lens, a rim surrounding said recess slightly projecting from the inner surface of said lens, an opaque screen arranged within said recess and covering the bottom portion thereof, a pair of frameless and self-supporting color-selective light-transmitting tubular members arranged in coaxial relation with regard to said lamp and radially spaced from each other, and means for telescoping selectively each of said pair of members between active and inactive positions.

3. A flashlight comprising in combination a casing, a concave reflector arranged at one end of said casing, an electric lamp arranged within said reflector, a pair of tubular color-selective light-transmitting elements of different diameter coaxially arranged with respect to said lamp, a lens arranged in the plane defined by the axially outer edge of said reflector, an opaque overlay limited to the center area of said lens in abutting relation with the undersurface thereof and directly attached thereto, and a pair of slides each for manually operating one of said pair of elements each having a sufficiently long stroke to permit each of said pair of elements to be shifted selectively from a rear position to a forward position wherein the axially outer end thereof is situated substantially in the plane of said lens and said overlay.

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