March 25, 1969 O. W. READING 3,435,203

COLOR FILTER FOR LIGHT BULBS

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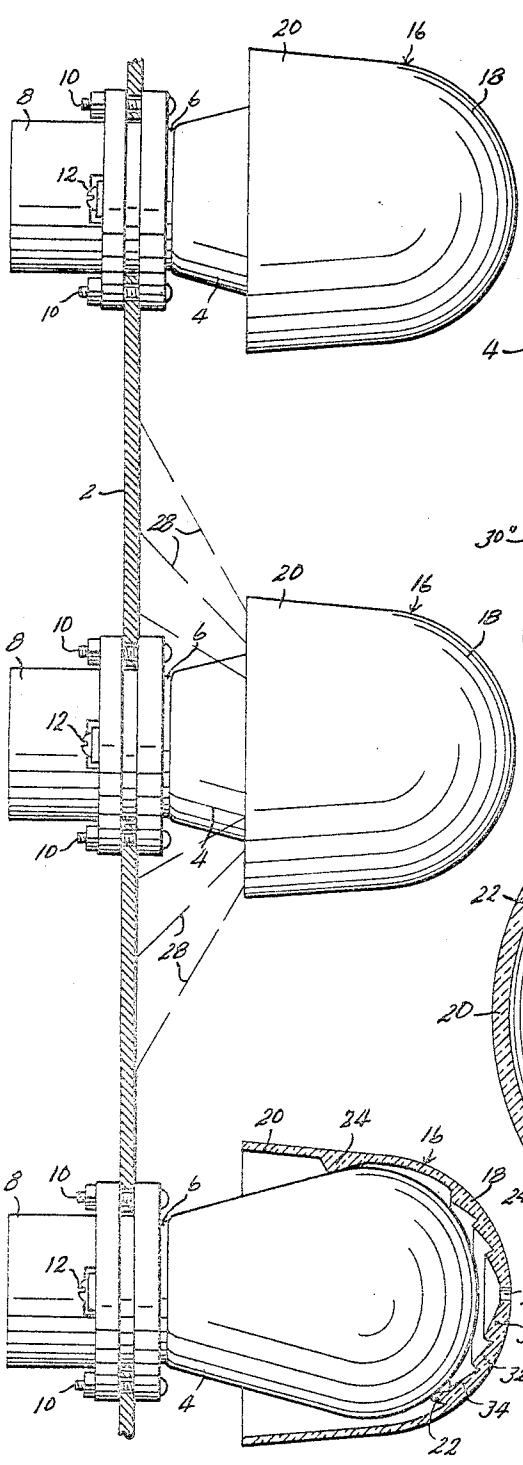


Fig. 1

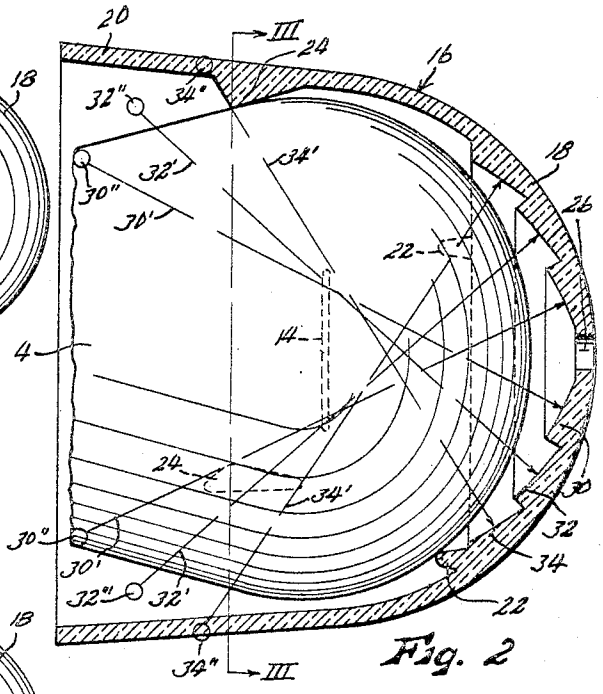


Fig. 2

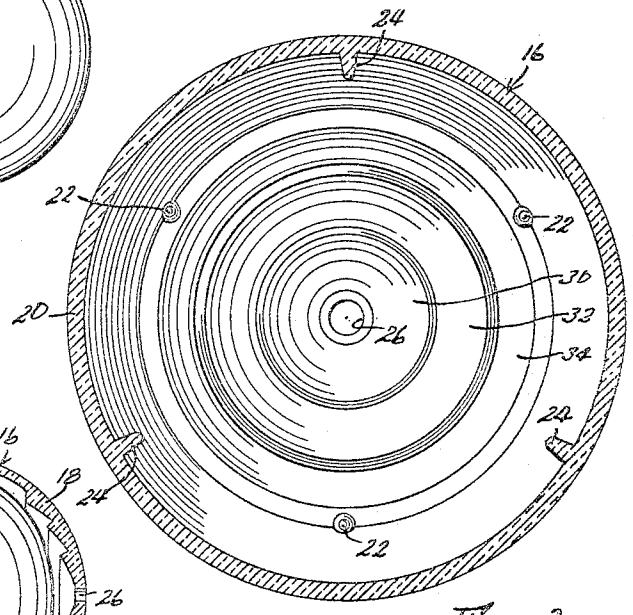


Fig. 3

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COLOR FILTER FOR LIGHT BULBS

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ABSTRACT OF THE DISCLOSURE

A cup-shaped and translucent filter member adapted to be applied over the free end portion of each electric bulb of an electric advertising or display sign to permit the changing at will of the apparent color of the bulb so that multi-colored effects may be obtained with the use of clear bulbs. The filter member is open at its rearward end to permit back-lighting of the sign panel with clear light, and has prismatic elements formed therein to improve the distribution of light emanating from the bulb.

This invention relates to new and useful improvements in the electric sign art, and is an improvement over the invention shown in my copending application Ser. No. 382,826, filed July 15, 1964, now Patent No. 3,312,814. It relates to a cup-shaped filter member of transparent or translucent material adapted to be applied over the free end portion of each electric bulb of an electric display or advertising sign. The primary objects of the filter as disclosed in my prior application are the obtaining of a colored bulb effect with ordinary clear bulbs, which are much less expensive than comparable colored bulbs, and the provision of a wider and more varied range of decorative effects, since the filters may be produced with a better color and in a wider variety of colors than would be practical for the production and stocking of colored bulbs, and also since the filters, though producing a colored-bulb appearance, also permit backlighting of the sign panel with the normal clear white light of the bulbs, said clear light escaping from the open end of the filter.

The primary object of the present improvement is the provision, in a filter of the character described, of prismatic elements incorporated integrally in the filter cup whereby to improve the pattern of light distribution from the bulb. For example, in the most common bulb, the filament loop is disposed in a plane at right angles to the bulb axis, so that the bulb appears brightest when viewed straight-on parallel to its axis, while appearing relatively dim when viewed angularly from the side. In the present invention, the normally forwardly concentrated light of the bulb is diffused evenly over a much wider angle, so as to present a uniformly brilliant appearance regardless of the angle from which it may be viewed. This is the form of the invention actually illustrated, although it will be apparent that the prismatic elements could be arranged to produce various other effects if desired.

Further objects of the present invention are the provision of a filter of the character described which tends to protect the bulbs against damage due to impact blows thereagainst, and which cannot trap and retain rain water or the like when the cup form thereof is in an upright position.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability for use in a wide variety of applications.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

FIG. 1 is a fragmentary sectional view through the panel of an electric sign including a series of electric light bulbs, each of said bulbs having a color filter embodying

the present invention applied operatively thereto, one of said filters being broken away and shown in section,

FIG. 2 is an enlarged fragmentary view similar to FIG. 1, showing one of the filters in longitudinal section, and

FIG. 3 is a sectional view of the filter only, taken on line III—III of FIG. 2.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to the panel of an electric sign of the type including a series of light bulbs 4 disposed at the outer side of the panel. Said bulbs are usually arranged in patterns, or in solid banks forming patterns, and large signs often include hundreds or even thousands of bulbs. The bulbs usually have the size and shape shown in the drawing, each bulb being generally spherically bulbous in form at its outer end and being conically tapered to a screw base 6, the bulb being mounted by threading base 6 into a socket member 8 secured in panel 2 by bolts 10, said socket member being provided, behind the panel, with terminal posts 12 for the connection of wires furnishing electric power to the bulb. While the general internal construction of the bulb is not pertinent to the present invention and is not shown, it will be understood that the filament is generally centered in the bulbous outer end portion of the bulb, and most commonly is disposed in a plane at right angles to the bulb axis, as indicated at 14 in FIG. 2.

To my knowledge, it has heretofore been necessary to purchase colored light bulbs whenever it is desired to use color as a feature of the sign, the color being permanently applied by the manufacturer in the form of a paint-like coating applied to either the inner or outer surface of the bulb. These coatings are available in only a limited number of colors, and do not transmit true, clear and pleasing colors. Moreover, such colored bulbs are much more expensive than clear bulbs, so that the maintenance cost of replacing burned-out bulbs in large signs is multiplied.

According to the present invention, clear bulbs may be used, and any desired color provided for each bulb, by a color filter designated generally by the numeral 16 and consisting of a cup-shaped body member formed of transparent or translucent material, preferably molded plastic, of the desired color. It is of a size and shape to fit over the bulbous end of the glass envelope of the bulb in coaxial relationship thereto, having a generally spherical closed-end portion 18 and a skirt portion 20 at the open end thereof. Said skirt, while generally cylindrical, may be taperingly enlarged toward its open end for convenience of removing it from the mold which it is formed. The internal diameter of the filter is somewhat larger than the bulb, in order to provide an air space therebetween for the circulation of air to prevent overheating of the bulb. The bulbs ordinarily used in electric sign work are of sufficiently low wattage that they do not become particularly hot when fully exposed to the atmosphere, but tightly enclosing them with the filters might so insulate them against the escape of heat that overheating could occur, or softening of the plastic material of the filters themselves might occur, were it not for the spacing described.

The filter is held in properly centered relation to the bulb surface by a plurality of fingers 22 formed integrally with the interior surface of the spherical end portion 18 of the filter and extending toward the open end thereof, said fingers being spaced apart from the axis of the cup and spaced apart angularly thereabout, and a plurality of tabs 24 formed integrally with the interior surface of skirt portion 20 of the filter and extending inwardly therefrom, said tabs being spaced angularly about the skirt, and being angularly staggered with respect to fingers 22. Fingers 22 contact the bulb outwardly from its waist, i.e. its plane of largest diameter, and tabs 24 engage the tapered surface

of the bulb inwardly from its waist, whereby to hold the filter firmly in position on the bulb as shown. The plastic material of which the filter is formed is sufficiently flexible that tabs 24 may be deformed resiliently to pass over the waist of the bulb, and then recover their normal contour. Both the tabs 24 and the fingers 22 are sufficiently flexible to permit momentary deflection of the filter with respect to the bulbs in the event of a blow striking the filter, thus tending to protect the bulb against breakage resulting from such a blow. This effect is further enhanced by the angular staggering of the tabs and fingers, since any blow striking the filter will be unidirectional, and due to said staggering will be in a direction in which the filter is relatively poorly supported either by the tabs or by the fingers, so that yielding of the filter can occur easily. A hole 26 is formed centrally in the spherical cup portion 18 of the filter. This hole further improves the circulation of air between the bulb and the filter, as previously described, and also serves as a drain hole for rain water or other moisture which might otherwise collect in the filter in the event it must be installed with its open end facing upwardly.

The skirt portion 20 of the filter may of course be of any desired length, and could be of such length as to reach substantially all the way to panel 2 and thus substantially completely enclose the bulb. However, making the total depth of the cup substantially less than the axial length of the bulb, as illustrated, permits an unusual display effect in the sign construction shown, in that it leaves a portion of the bulb exposed so that if a clear bulb is used, white light from the exposed portion of the bulb will illuminate the surface of panel 2, as indicated by light rays 28 in FIG. 1, so that the panel will appear in its own normal color even though it may contrast to the filter color. As previously discussed, light from a colored bulb will not effectively illuminate a panel of a contrasting color, since by definition a colored panel is one which will effectively reflect only light of its own color. This creates many novel possibilities of display, for example in contrasting the panel, and the like.

A particular feature of the present invention is the inclusion in a filter as thus far described of additional means for improving the optical distribution of light as may be desired or necessary in certain circumstances. For example, if the bulb filament 14 is disposed in a plane at right angles to the bulb axis, as shown, it appears brightest when viewed directly from the front in a direction parallel to its axis, while appearing to be relatively dim when viewed from the side. This directional effect is ordinarily objectionable since a sign usually is installed so as to be viewed from many different angles. The drawing illustrates means for correcting this particular problem, said means consisting of thickening of the spherical cup portion 18 of the filter to provide a series of ring-shaped prisms 30, 32 and 34 disposed in concentric relation coaxially about the axis of the filter. Preferably, these prisms are formed by imparting a sawtooth configuration to the inner surface of the filter as shown. Each prism is thicker at its outer diameter than at its inner diameter. Also, the inner surface of each prism is curved in a plane including the filter axis, the radii of this curvature of the prisms being indicated respectively at 30', 32' and 34' in FIG. 2, and the centers of curvature being indicated respectively at 30'', 32'' and 34''. It will be seen that these radii of curvature intersect the filter axis forwardly of bulb filament 14. Thus light from filament 14, or a major portion thereof, will strike any point of the inner surfaces of the prisms at an acute angle rearward of a line normal to the surface at that point, and thus will be refracted or "bent" away from the axis of the filter. When properly designed, the prisms thus provide an even diffusion of the light which would otherwise be concentrated in a forward direction, over the entire cone defined by the outermost prism ring 34 with the filament as its apex. The bulbs thus appear to be of uniform intensity when viewed from anywhere within this cone, which is large enough to include all normal effective viewing angles, and this is considered to be a decided advantage in effective sign presentation. Stated in another way, the inclination onf the inner surfaces of prism rings 30, 32 and 34, in a plane including the filter axis, should be such that a line erected normally to any point thereof will intersect the axis of the filter at a point ahead of the bulb filament, or between the filament and the closed end of the filter, when the filter is attached to the bulb as described. While three prism rings are shown and described it will be apparent that a larger number of rings could be used if desired to produce a still more uniform distribution of light. However, three have been found to be quite adequately effective.

It will be apparent also that prismatic elements could be formed in the filter for purposes and effects other than those just described. For example, some bulbs have filament wires which extend generally parallel to the bulb axis, so than they appear brighter when viewed from the side than when viewed from the front. In that event, even distribution of light may require that light emanating laterally from the bulb be refracted into a more nearly axial direction. To this end, the prisms 30, 32 and 34 could be so prepositioned that their radius lines 30', 32' and 34' intersect the bulb axis rearwardly of the filament, rather than forwardly thereof as shown. In some cases, as where a sign will commonly be viewed from one direction only, it may be desired to use prisms capable of concentrating light into a "beam" concentrated in that direction, so as to provide a greater apparent light intensity, or to permit the use of lower power bulbs. It may also be desirable in some instances to use prisms in the form of patterns of raised protuberances of diamond or spherical configuration, so as to produce a multi-point light giving a glittering or gem-like effect. The possibilities are too numerous to catalog.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. A filter for a light bulb having a waist portion of largest diameter and being reduced in diameter at both sides of said waist, said filter comprising:

(a) a cup-shaped body member of colored translucent material adapted to be applied coaxially over the free end portion of said bulb, being of sufficient depth to enclose the waist of said bulb and being of greater internal dimensions than said bulb whereby to provide an air space therebetween, and

(b) a plurality of widely separated protruberances affixed to the inner surface of said body member and projecting inwardly therefrom to engage said bulb, whereby said body member is centered with respect to said bulb, said protuberances being divided into two sets, the first set being angularly spaced apart about the axis of said body member and engaging said bulb at one side of the waist thereof, and the second set being angularly spaced apart about the axis of the body member in staggered relation to the protuberances of said first set and engaging said bulb at the opposite side of said waist, the protuberances of at least the set thereof closest to the open end of said body member being resiliently deflectable whereby to be capable of passing over the waist of said bulb.

2. A color filter as recited in claim 1 wherein each protuberance of both of said sets of protuberances is formed of resilient material whereby to be deflectable transversely to its direction of extension from said body member.

3. A color filter for a light bulb having a filament disposed in a plane substantially at right angles to the bulb axis, said filter comprising:

(a) a cup-shaped body member of colored translucent material adapted to be applied coaxially over the free end portion of said bulb to enclose at least the portion of said bulb including said filament, said filter having greater internal dimensions than said bulb whereby to provide an air space therebetween, said body member having sections thereof forming prisms constituting a series of concentric annular rings formed in the inner surface of said body member coaxially therewith, the inner surfaces of said prism rings being so inclined that lines extending normally therefrom will intersect the axis of the body member at points between said filament and the closed end of said body member, when said body member is positioned in assembly with said bulb, and

(b) means for securing said body member in assembly with said bulb.

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