July 27, 1965 A. F. DUMDEI 3,197,630

REFLECTOR AND LENS ASSEMBLY

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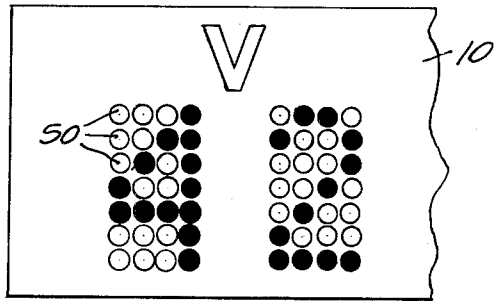


FIG. 1.

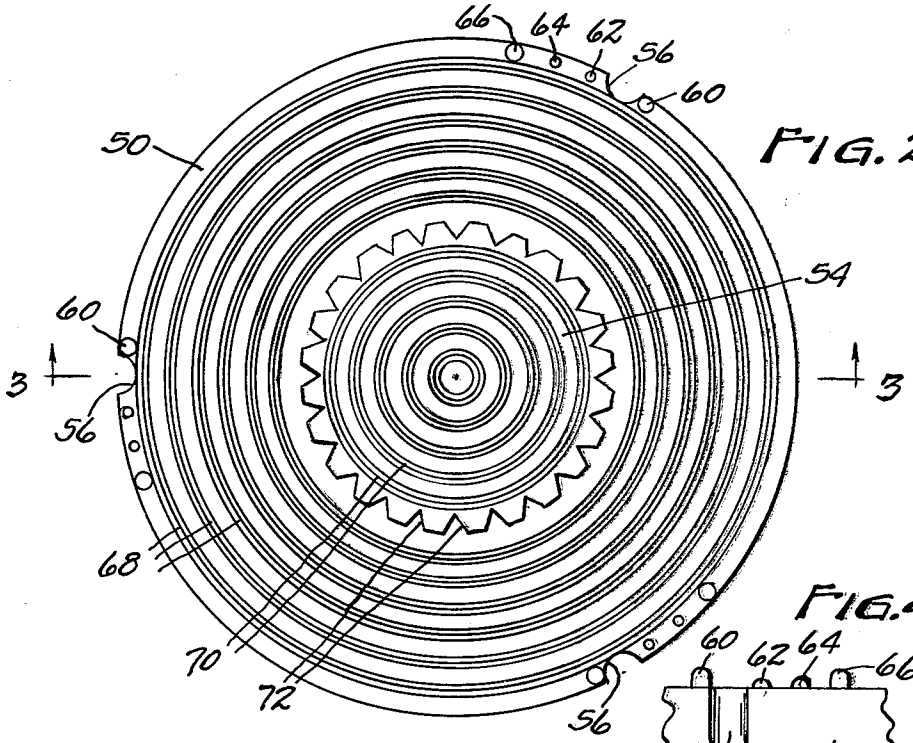
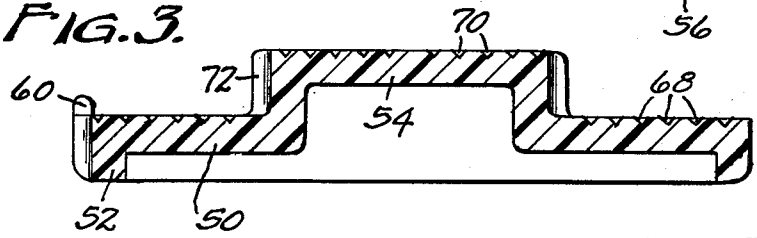


FIG. 2.

FIG. 4.

FIG. 3.



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FIG. 5.

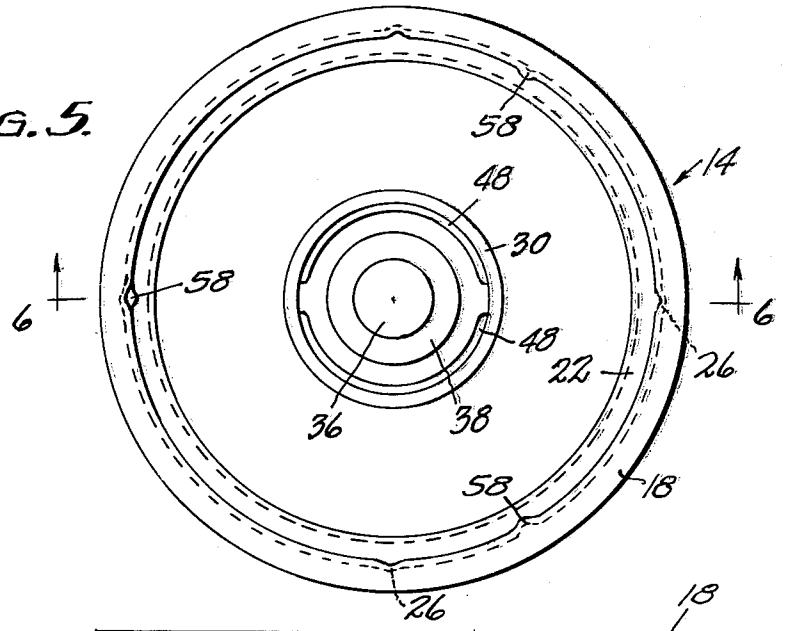
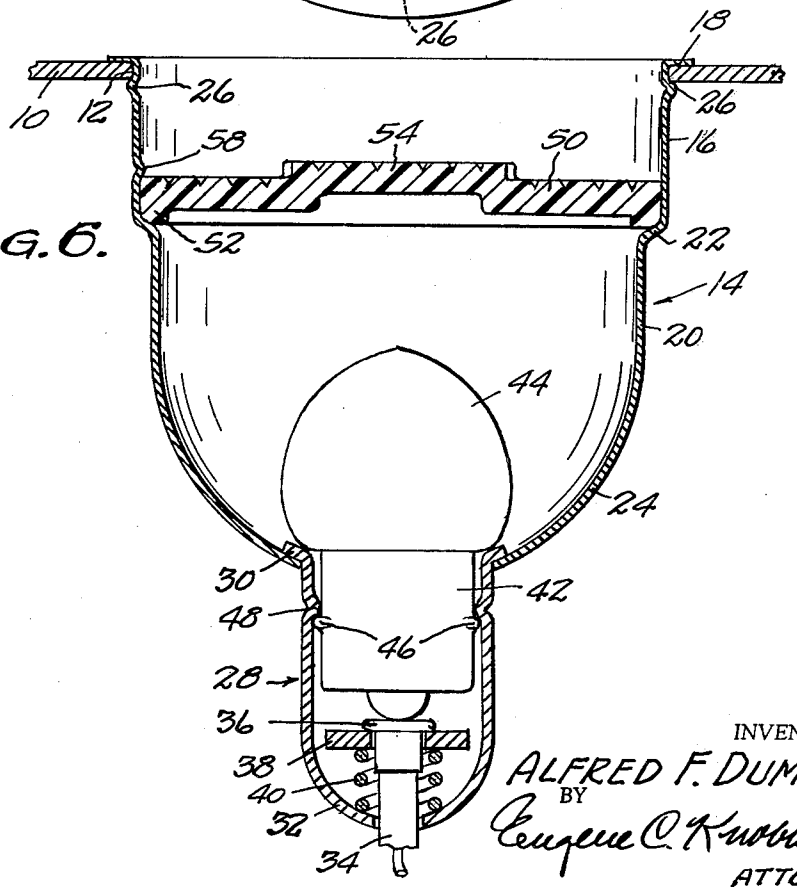


FIG. 6.



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REFLECTOR AND LENS ASSEMBLY

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This invention relates to a reflector and lens assembly, and more particularly to such an assembly used for signalling purposes, such as for use in electric scoreboards for athletic contests.

Heretofore it has been common practice in mounting signal lights in installations such as electric scoreboards to provide threaded light bulb socket means, lamps with screw-threaded bases, tubes carried by the board surrounding each lamp and projecting from the board to separate the lights, wiring panels with contact bars mounted thereon, and other parts which render the construction cumbersome, expensive, subject to breakage of lamps or of glass face or lens plates, if used, and to pilferage of lamp bulbs where exposed.

The primary object of this invention is to provide a novel, simple construction which overcomes the defects and disadvantages of prior constructions and is characterized by minimum parts, ease of assembly and replacement of parts and protection against pilferage and breakage.

A further object is to provide a device of this character utilizing a lens formed of synthetic resin and characterized by permanence and consistency of color in a wide range of color selections and by resistance to breakage to protect lamp bulbs therebehind.

A further object is to provide an assembly of this character having a novel molded lens with novel means to mount it in selected position and to accommodate its manipulation for installation and removal.

Other objects will be apparent from the following specification.

In the drawings:

FIG. 1 is a fragmentary face view of a scoreboard embodying my invention;

FIG. 2 is an enlarged face view of a lens utilized in the device;

FIG. 3 is a sectional view of a lens taken on line 3—3 of FIG. 2;

FIG. 4 is a fragmentary edge view of a lens;

FIG. 5 is a face view of the lamp mounting means;

FIG. 6 is a sectional view taken on line 6—6 of FIG. 5, and illustrating the lamp assembly.

Referring to the drawings which illustrate one embodiment of the invention, the numeral 10 designates a wall or panel which supports the reflector and lens assembly and which may constitute a part of a signalling device, such as an electric scoreboard. The panel 10 has a number of openings 12 formed therein in any selected spacing and arrangement, for example, as illustrated in FIG. 1 for scoreboard use where a plurality of groups of closely spaced openings are provided in a selected geometric arrangement. Each of these openings mounts one of my new reflector and lens assemblies. Suitable means (not shown) will be provided for the control of the individual light bulbs or lamps in the manner well understood in the art. Thus for scoreboard use selected lights in each group may be energized to expose a selected numeral. Thus as illustrated in FIG. 1, two juxtaposed groups of lamp assemblies are provided and selected lamps of each group are shown energized to indicate the numeral "42." It will be understood that any numeral, letter or design can be provided, the latter being useful in animated advertising signs.

A sheet metal reflector 14 is mounted in each opening 12 of the panel 10. This reflector is generally of cup

shape and includes a substantially cylindrical or tubular mouth portion 16 having an outturned marginal flange 18. The tubular portion 16 is separated from a rear or inner reduced part 20 by a circumferential shoulder 22. The rear or inner end of part 20 is preferably part-spherical at 24. Two or more outwardly projecting protuberances 26 are formed in the cylindrical part 16 spaced from the flange 18 a distance approximately equal to the thickness of the panel 10. These protuberances accommodate anchorage of the reflector in the opening of the panel by the simple expedient of inserting the reflector into the opening and pressing against the flange 18 until the protuberances 26 pass through the opening 12 and snap outwardly against the rear surface of the panel at the margin of the opening. It will be understood, however, that the use of the protuberances 26 as a means to anchor the reflector 14 to the panel 10 is illustrative and is not intended to be limiting, and any other means found suitable for the purpose of anchoring the reflector may be utilized.

The spherical portion 24 of the reflector has an opening therein coaxial with the reflector portions 16 and 20, and a lamp bulb mounting socket 28 is mounted in said opening. The socket 28 has a generally tubular metal portion which fits snugly in the reflector opening and has a flange 30 positioning said socket which is held in the opening by any suitable means, such as soldering. Socket 28 is cup-shaped and has an end portion 32 with a central opening through which passes an insulated electrical conductor 34 with slight clearance to accommodate free sliding thereof in said opening. The conductor 34 mounts a contact button 36 having an enlarged head. A washer 38 encircles the contact button and bears against the enlarged head thereof, being pressed away from the end wall 32 by a coil spring 40 interposed between end wall 32 and washer 38. Socket 28 constitutes a bayonet type receiver for the base 42 of a small lamp bulb 44. The lamp bulb will preferably be of the type commonly used in automobile lights and which operate at a low voltage, such as 12 volts or 14 volts. The lamp bulb 42 may have protuberances 46 which engage behind an interrupted internal socket rib 48 formed in the socket member 28. It will be understood that the protuberance or rib 48 will be so positioned with reference to the size of the bulb to be employed that a bulb may be inserted therein readily and quickly and retained upon partial rotation of the bulb incident to spring pressure of contact button 36 against the base of the bulb.

A lens 50 is mounted in a cylindrical part 16 of the reflector bearing against the shoulder 22. This lens is preferably formed of a synthetic resin, such as an acrylic type resin.

The lens is molded and is preferably of uniform wall thickness throughout. In its preferred form the lens consists of a disk having a marginal annular flange 52 and a central offset portion 54. The margin of the lens is preferably provided with a plurality of equispaced notches or recesses 56 which are of a size to pass around a plurality of equispaced protuberances 58 formed in the cylindrical portion 16 of the reflector spaced from the shoulder 22 a distance substantially equal to the thickness of the lens at its flanged rim portion 52. Adjacent each of the notches 56 the outer face of the lens is provided with a plurality of projections. One projection 60 is preferably located alongside each notch 56 in a clockwise direction from said notch as viewed in FIG. 2. A second shallower projection 62 is located adjacent each notch at the opposite side thereof. A third projection 64, preferably shallow like projection 62, a spaced circumferentially from projection 62 and a fourth projection 66 is spaced circumferentially from each projection 64. The spacing between the projections 62 and 64 and between projections 64 and 66 in a circumferential direction is pref-

erably equal to or slightly greater than the circumferential dimension of each of the protuberances 58 in the wall of the reflector. The two projections 60 and 66 are preferably of such dimension that they form stops which engage the protuberances 58 and limit rotative movement of the lens when they engage protuberance 58. The shallower projections 62 and 64 constitute snap lock means cooperating with protuberances 58 to hold the lens in any selected rotative position. The lens fits snugly and slidably within the reflector and is inserted in place when the grooves 56 register with the protuberances 58 so that the rear edge of the lens flange 52 may bear against the shoulder 22 of the reflector. Thereupon rotation of the lens in a clockwise direction, as viewed in FIG. 2, will cause one or both of the projections 62 and 64 to snap past the adjacent reflector protuberance 58 and thereby hold the lens firmly in place. Thus each lens is mounted by a modified bayonet slot type of connection.

Each lens may be of any selected color and will be translucent. I prefer also to provide in the surface of the lens a plurality of shallow concentric grooves 68 at its outer portion and a similar set of shallow concentric circular grooves 70 in its central portion. The margin of the central portion 54 is preferably notched at 72 and is generally cylindrical so that it may fit in a socket of a tool for manipulating the same, for rotating it and withdrawing it, or applying it.

It will be apparent from the foregoing description that the device possesses many advantages which are particularly important in installations like scoreboards, advertising signs, and the like, where a large number of reflector and lens assemblies are to be mounted in a given structure. The provision for a self-locking means for mounting the reflector itself in an opening in a panel 10 by simply pressing the same to position with the protuberance 26 locking the same, provides for rapidity of assembly, reduction of labor and eliminates the necessity for the use of tools. Similarly the bayonet type mounting and removable mounting of the lens 50 is important. Note that in each instance only the part being mounted need be manipulated. That is, when the reflector is being mounted in the panel 10, only the reflector 14 itself need be manipulated. Likewise, when the lens 50 is being mounted in the reflector, only the lens itself need be moved. Thus no separate securing means are required. Another important consideration is the recessing of the lens 50 in the reflector to a slight extent to protect the same. Such protection is two-fold. First, to protect against impact with the lens by an object striking the panel 10. The second advantage of the inset position of the lens is that the tubular part 16 of the reflector serves as a means to maintain the individual luminosity of each lamp and to avoid diffusion of light from adjacent lamps. Another advantage of the mounting of the lens which is obtainable in cases where the projections 62 and 64 are of slightly different height or dimension is that variations in the thickness of the molded lens may be accommodated. Thus, if the lens is not firmly anchored when the first projection 62 snaps past a protuberance 58, further rotation of the lens to cause the second projection 64 to snap past the protuberance 58 will provide for firm mounting and positioning of the lens.

One of the important considerations of the device is the fact that the number of parts required for each reflector and lens assembly is held at a minimum. This is made possible by the bayonet type mounting of the reflector in the panel 10, the bayonet type of mounting of the lens 50 of the reflector, and the bayonet type mounting of the lamp 44 in the lamp socket 28.

Another advantage of the device is that the lamp bulb utilized may be of low voltage which generates low heat temperatures. At the same time sufficient light is generated for the purpose of signalling or scoring. The use of such a lamp bulb, especially as here mounted in a protected position, reduces bulb breakage, prolongs bulb life,

and is particularly important in resisting adverse effects upon lamp bulbs in cases where the mounting unit is subject to vibration. A long life of the lamp bulb can be assured even though the bulbs are enclosed in the reflector by the lens because the socket 24 and the reflector has a large area for heat dissipation, and these parts may be formed of thin metal and may be mounted in a structure in such a manner as to be exposed to circulating air serving to cool the same. If desired, openings (not shown) may be formed in the rear portion of the socket 28 for air passage therein, and it is also possible to provide openings within the reflector 14, as at the part 20 thereof, for further heat dissipation.

The reflector can be provided with inner surfaces so curved and polished as to concentrate and collect light and to focus the light so that all of the light passes through the lens in a concentrated beam. The uniformity of thickness of the lens is important for both light direction and uniformity and for the purpose of avoiding such differences in wall thickness as might tend to subject the lens to adverse reaction when heated. The lens configuration with its central projecting portion 54 providing integrally therein a portion for gripping the same without interfering with uniformity of the propagation of light therethrough is another element of importance.

While the preferred embodiment of the invention has been illustrated and described, it will be understood that changes in the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. In combination,
a mounting member having an opening,
a reflector unit adapted to mount a lamp bulb and having an open end part mounted in said mounting member opening,
said unit having an internal circumferential shoulder spaced inwardly from its open end,
a synthetic resin molded lens within and spanning said unit and bearing aganst said shoulder,
spaced lens retainer means carried by and projecting into said unit spaced from said shoulder,
said lens having marginal recesses clearing said retainer means during lens insertion and adapted to be positioned in rotatively spaced relation from said retainer means in the operative position of the lens and projections on said lens engaging said retainer means upon rotation of said lens to disalign said recess and retaining means.

2. In combination,
a mounting member having an opening,
a reflector unit adapted to mount a lamp bulb and having an open end part mounted in said mounting opening,
said unit having an internal circumferential shoulder spaced inwardly from its open end,
a molded translucent lens having a plurality of marginal notches and a plurality of projections adjacent its margin and projecting from its outer face at opposite sides of each notch, and
inwardly projecting lens retainer means in said unit spaced circumferentially similarly to said notches and spaced from said shoulder a distance substantially equal to the thickness of the margin of said lens and engaging said lens projections upon rotation of said lens to disalign said lens notches relative to said lens retainer means when said lens engages said shoulder.

3. The combination defined in claim 2, wherein
said lens projections are arranged in groups of different dimensions adjacent each notch and each engageable with a retainer.

4. The combination defined in claim 2, wherein
said lens projections are arranged in groups spaced from each other and projecting to different predetermined

extents from the outer marginal surface of said lens.

5. In a signalling device,

a mounting member having a plurality of spaced openings,

a reflector unit mounted in each opening,

each reflector unit carrying a lamp bulb at its inner end and having an open outer end part with anchor means engaging said mounting member,

each reflector unit having an internal shoulder spaced from its open end part and from said bulb and a pair of spaced internal projections spaced from said shoulder,

a lens fitting in and spanning said reflector unit and seated between said shoulder and said projections,

said lens having marginal recesses slidable past said reflector projections and lens surface projections adjacent and circumferentially spaced from said recesses and having interlocking engagement with said reflector projections upon rotation of said lens from a position in which said lens recesses register with said reflector projections while said lens engages said shoulder.

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