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FLASHLIGHT

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## FLASHLIGHT

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This invention relates to flashlight constructions and especially to improvements in the head end portion thereof.

Although many different constructions have heretofore been proposed, a constant problem and difficulty has been the loss of effectiveness and efficiency due to poor bulb location; shifting of the bulb or reflecting surface due to loose parts initially improperly assembled or which have shifted by shock or vibration; distortion of parts in handling and breakage.

An object of the present invention is to provide a flashlight head end construction that is of sturdy construction, economical to produce, foolproof and easy to assemble.

Another object is to provide a flashlight construction in which the bulb may always be positioned in proper relation to the reflecting surface to obtain maximum efficiency.

Another object is to provide a flashlight head end construction in which the area of greatest light intensity of the bulb therefore may be located at the local point of the reflecting surface without need for adjustment when replacing bulbs.

A further object is to provide a flashlight head end construction including an integral head and reflector in which the latter is of highly efficient character.

An additional object is to provide a flashlight head end construction including a window and a resilient ring-like bezel of elastomeric material for easily assembling and securing the window to the head and adapted to protect the parts from shock and damage.

Another object is to provide a flashlight head end construction in which the head comprises a die cast metal member having a highly reflective plated and polished parabolic surface.

A specific object is to provide a flashlight head end construction having an integral head and reflector of generally parabolic shaping in which the concave face comprises a polished aluminized reflective surface.

Another object is to provide a flashlight head having an integral plastic window and bezel.

The foregoing and other objects and novel features of this invention will be apparent from the following description taken in connection with the accompanying drawing forming a part thereof wherein:

Figure 1 is a cross-sectional view of a flashlight construction embodying the novel features of my invention;

Figure 2 is an end view of the window and bezel structure of Figure 1;

Figure 3 is a cross-section view of a modification employing an integral die cast metallic head and reflector;

Figure 4 is a cross-sectional view of a further modification; and

Figure 5 is a fragmentary cross-sectional view of a modified form of window and bezel.

Referring more particularly to the drawing wherein similar numerals designate corresponding parts of the construction, the flashlight structure of my invention

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comprises a casing or body portion generally referred to by the numeral 10 and a head end portion generally designated by the number 12. The casing 10 includes a barrel portion 14 and an end cap and spare bulb carrier 16 and the head end portion includes an integral head and reflector 18, a conventional lighting bulb 20 and associated contact mechanism 22 and a window and bezel structure 24.

The barrel portion 14 of the casing is preferably made of metal and is of cylindrical shape. Its forward end is internally threaded as at 26 to receive an external thread 28 on the neck portion 30 of the head 18. Its rearward end is externally threaded as at 32 to receive the internal threads 34 of the cap 16.

The casing is of a diameter and length to accommodate a desired number of electrical dry cells 36, two being shown, these being resiliently retained in contact with the bulb contact mechanism 22 by a conical spring 38.

The barrel 14 is outwardly formed as at 40 to receive and mount a conventional switch mechanism which includes a make and break switch 42 comprising a stationary contact member 43 secured to the barrel 14 and a resilient button controlled contact 44 insulated from the barrel at 45 and having an extension 46 permanently in contact with the bulb contact mechanism 22 as hereinafter described.

Outwardly flaring from the neck portion 30 of the head 18 in Figure 1 is a generally conical, or concave-convex shaped wall 47 terminating in a peripheral edge face or rim 48 forming a shoulder 49 with the outer or convex face 50 of the wall 47. By preference the interior or concave face 51 of the wall 47 of the head 18 is made of parabolic shape and preferably has its focus at a point corresponding to the point of greatest light concentration of the bulb 20. The head 18 in Figure 1 is preferably made of a synthetic plastic composition such as an acrylic resin such as Lucite or Plexiglas or an acetate butyrate like Tenite. I have found that such produces an excellent and efficient light reflecting surface when its internal face 51 is provided with a deposited aluminized high reflecting surface layer.

The neck portion 30 of the head 18 has a central stepped bore 52 providing an opening 53 through which the glass globe of the electrical bulb or lamp 20 may project and a forward shoulder portion or inwardly projecting flange 54 having a recess or seat 55 which receives a collar-like metallic contact flange 56 of the bulb 20. The seat portion 55 is an important feature of my invention since it provides a fixed and predetermined location for the flange 56 of the bulb 20 both endwise and centrally of the reflecting surface 51 to assure maximum reflecting power.

The bore 52 also includes a threaded portion 57 in which is screwed a bushing 58 of insulation material having a shoulder 59 which seats against the face 60 of the neck portion 30 of the head 18 when this bushing is drawn up tight. The bushing has a bore or recess 61 open at its forward end and closed at its rearward end by a wall 62, and has an annular wall 63 which encompasses the base portion 64 of the bulb 20. A metallic compression spring 65 having its base end seated against the wall 62 biases the collar 56 of the bulb 20 resiliently against the seat 55 of the head 18.

The base coil 65 of this spring will preferably be tight in the bore 61. Secured by a ring of rivets 66 to the wall 62 of the bushing 58 is an annular shaped dish contact plate 67 which has an opening 67a received over a central external projection 68 of the bushing 58. The rivets are at a sufficient radius to permit contact of their head portions by the conical spring 65. The contact plate 67 is arranged to be in constant electrical contact with the extension 46 of the flexible switch contact element

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of the switch 40. A button head rivet 69 centrally of the bushing 58 mounts one leg 70 of a U-shaped metallic spring contact element 71, the other leg 72 of which is resiliently biased into contact with the central contact 73 in the base 64 of the bulb 20. The external head of the rivet 69 is resiliently contacted by the positive carbon electrode 74 of the cell 36 by reason of the spring 38.

When the switch 42 is pressed closed current will flow from the negative pole of the rearmost cell 36, to wit the cell casing 75 thereof, through the spring 38, cover 16, casing barrel 14, switch 42, contact 46, plate 67, rivet 66, spring 65, and collar 56, to one side of the bulb filament returning by the contacts 73, 71, 69, to the positive pole 74 of the most forward cell 36.

It will be observed that bulbs may be readily replaced by removing the head 18 from the barrel 14 and unscrewing the bushing 58 from the bore 52, the spring 65 coming out with the bushing and permitting the old bulb to be removed and a new one inserted. It is preferred that the direction of coiling of the spring 65 be such that the spring turns tend to open in response to any frictional resistance at the collar 56 when the bushing 58 is unturned. Moreover, it will be noted that the annular contact plate 67 provides a good electrical contact with the spring contact 46 regardless of the position of the bushing 58 rotatably speaking. It will also be understood that if desired the bushing 58 may be made of metal in which event the rivet contact 69 will be insulated by a suitable grommet (not shown) from the bushing 58.

The window and bezel structure in Figure 1 comprises a flat circular window or lens 79 which may be of glass or a clear transparent synthetic plastic for instance, an acrylic resin such as Plexiglass. The lens 79 is held against the rim 48 of the head 18 by a polygonal-shaped resilient ring 80 of a rubber like or elastomeric material for instance a synthetic plastic for example, neoprene or polyethylene. It will be noted that the ring 80 has inturned flanges 81, 82, the distance between which is made slightly under the combined thicknesses of the lens 79 and rim 48 such that the lens will be securely held against the rim 48. Moreover, the ring 80 will have sufficient flexibility and stretch such that the flange or lip 82 of the ring may be snapped over the shoulder 49 of the rim. The polygonal sides 83 of the ring 80 will provide suitable faces to prevent rolling of the flashlight when placed on a surface. It will be understood that the ring 80 may if desired be completely circular externally thereof instead of polygonal in shape.

The modification in Figure 3 embodies many of the novel structural features of Figure 1 with respect to assembling the bulb 20 but differs therefrom for example in that the integral head and reflector 18a of Figure 3 instead of being of plastic material is a metal die casting in which the reflecting surface 51a may be polished, or plated and polished to provide what I have found to be an exceptionally efficient reflecting surface of the metal of the head 18a or of a silvered character where it is of a plated layer. In order to effect this result I provide an annular ring 85 of insulation material between the head 18a and the casing 14. This ring 85 is fixed in any suitable manner to an annular land 86 of the neck portion 30a of the head 18a. The ring 85 is externally threaded to threadedly telescope with the forward threaded end 26 of the casing barrel 14.

Another distinction is the manner of locating the bulb 20 relative to the reflector surface and providing circuiting for the bulb filament. Thus pressed in the bore 87 of the head 18a and projecting inwardly of the reflecting surface 51a is a metallic tubular element 88 having an inwardly turned forward flange 89 serving as a stop or abutment for the contact collar 56 of the bulb 20 which nests in this tube. The tubular element 88 also has an outwardly turned flange at its opposite end, identified by the numeral 90, which seats against the end face 60

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of the head 18a thus determining the location of the bulb 20. The element 88 is internally threaded to receive an externally threaded bushing 91 of insulation material. The bushing 91 has an annular wall 92 defining a bore 93 which loosely receives the base portion 64 of the bulb 20. The bore 93 is closed at its rearward end by a wall portion 94 which also provides an external shoulder or flange 95. Spun over the flange 95 is a U-sectioned metallic ring 96 which when the bushing is drawn up tight on the element 88, abuts and makes electrical contact with the flange 90 of such element. This ring maintains a constant pressure contact with the leaf spring contact 46 of the switch mechanism 40 thus providing one side of the electrical circuit for the bulb filament.

The other side of the circuit is provided by a button head pin or rivet 97 located in a central bore of the wall 94 this pin being in electrical contact with the carbon pole 74 of the cell 36. A conical compression spring 98 has its bottom turn in contact with the pin 97 and has its inner end or coil bearing against the central or base contact 73 of the bulb 20 to thus effect a circuit between the bulb and the positive pole 74 of the cell 36. This spring also functions to resiliently bias the bulb 20 forwardly of the tubular element 87 with its contact collar or flange 56 against the flange 89 of the element 87.

The window and bezel construction in Figure 3 is the same as that in Figure 1 it being understood that the window may be a flat or curved lens. If desired the head 18a may be made of insulation material such as described with respect to the head 18 of Figure 1. In that event the insulation ring 85 may be omitted and the casing 14 may be threaded directly on the head 18 in the manner shown in Figure 1.

Referring now to Figure 4, I have here illustrated a construction combining many of the features of Figures 1 and 3. Thus the neck portion 30b of the die cast metallic head 18b in Figure 4 includes a pair of concentric spaced cylindrical walls 100, 101 connected at their forward end by a transverse wall 102 so as to define a cylindrical recess 103 open at the rearward side of the neck 30b. As seen, the neck portion 30b may be said to possess a U-shaped wall section comprising the walls 100, 101, 102.

The wall 102 has a forward surface 104 which forms a continuation of the parabolic surface 51b of the head 18b. The wall 101 defines a bore 105 in which is pressed or cemented an insulation bushing 106 having a flange or shoulder portion 107 which abuts the inner end of the wall 101.

The remainder of the bulb carrying and contact structure of Figure 4 may if desired be like that in Figure 3 with the tubular member 88 of that figure a press fit in the bushing 106. However, as shown in Figure 4 the annular contact member 96 of Figure 3 is omitted from the bushing 91a and instead, the tubular bulb receiving member 88a has its inner end flange 90a inturned at 110 into the recess 103 to provide an annular contact face for maintaining constant pressure contact with an extension finger 112 of the leaf contact spring 46 of the control switch mechanism 40. The mode of making contact with the positive pole 74 of the cell 36 and the bulb base 73 is the same as in Figure 3.

The manner of holding the lens or window 79 in Figure 4 by a rubber-like ring 80a is similar to that of Figures 1 and 3 with this difference, that in Figure 4 the lens 79 is set in a recess 114 of the rim 48a of the head 51b. It will be understood that the bulb carrying and contact structure of Figure 4 may also be used in place of that shown in Figure 1 in which case the head 18 may if desired be of metal. The Figure 1 arrangement of locating the bulb collar or flange 56 is preferred because of its likelihood of providing a more accurate positioning of the bulb relative to the reflector surface.

In Figure 5 I have illustrated a form of bezel and

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lens structure which may be employed in any of the previously described constructions. Here the bezel ring and lens is combined into a single member 120 preferably of a clear plastic such as Plexiglas. The member 120 has a lens portion 122 here shown as flat but which may be curved, provided with a forwardly projecting peripheral bead 123 whereby the lens is protected and set back therefrom. It is also provided with a rearwardly extending annular peripheral flange 124 threaded internally to be screwed on to an external threaded portion 126 of the head 18d which may be any of those described above.

From the foregoing description of my invention it will be apparent that I have provided a novel and efficient flashlight construction. It will be understood that various changes and modifications will suggest themselves to those skilled in the art in the specific structure disclosed without departing from the spirit and intent of my invention. Accordingly, all such changes, modifications and equivalent structures coming within the scope of the appended claims are contemplated.

I claim:

1. In a flashlight including a casing and using a bulb having a globe portion, a base portion and a flange portion intermediate said base and globe portions, a head for said flashlight, said head including as an integral part thereof, a frontal reflector portion and a rearwardly extending neck portion for connection with said casing, an opening through said neck portion on the axis thereof and defining an annular wall, a tubular member carried in said opening and having an intumed annular forward flange providing a seat for the flange portion of said bulb and permitting the globe portion of said bulb to project from said member into said reflector portion of said head, a bulb retaining bushing removably mounted in said member and having a rearward wall, spring means operable between the base of said bulb and said wall for biasing the flange portion of said bulb against said seat, means in said wall in electrical contact with said spring means, a rearward outwardly turned flange on said member in abutment with said neck portion, a flange on said bushing, electrical conducting means carried by said bushing and surrounding the flange thereof and arranged in abutment with said outward flange of said member and switch means carried by said casing for making circuit with said conducting means.

2. A flashlight as claimed in claim 1, wherein said reflector and neck portions of said head are made of metal and said member is non-rotatably fixed to the said annular wall of said opening.

3. In a flashlight including a head and a tubular metal casing and using a bulb having a globe portion, a base portion and a flange portion intermediate said base and globe portions, said head including as an integral part thereof a metallic frontal reflector portion and a metallic rearwardly extending neck portion, an opening through said neck portion on the axis thereof and defining an annular wall, a metallic tubular member carried by said neck portion in said opening and having an intumed forward flange providing a seat for the flange portion of said bulb and permitting the globe portion of said bulb to project outwardly of said tubular member within said reflector portion, a bulb retaining bushing of insulation material removably mounted in said member and having a rearward wall, spring means operable between said bulb and said rearward wall for resiliently biasing the flange of said bulb against said seat, electrical contact means on said bushing and associated with the base of said bulb, annular electrical contact means rearwardly of said flanges and switch means carried by said casing for making circuit with said annular contact means.

4. A flashlight as claimed in claim 3 wherein there is a sleeve of electrical insulation material between said neck portion and said casing.

5. A flashlight as claimed in claim 3 wherein there is

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a bushing of electrical insulation material between said tubular member and said annular wall of said opening.

6. In a flashlight including a metallic casing and using a bulb having a globe portion, a base portion, and a flange portion intermediate said base and globe portions; a head for said flashlight, said head including as an integral part thereof a metallic frontal reflector portion and a rearwardly extending coaxial metallic neck portion, a sleeve of electrical insulation material mounted on said neck portion and forming a connection for said neck portion with said casing, an opening through said neck portion on the axis thereof, an annular seat in said opening normal to said axis and adjacent the reflector portion of said head for positioning the flange portion of said bulb with the globe portion of said bulb projecting outwardly through said opening within said reflector portion of said head, a bulb retaining bushing removably mounted in said opening, said bushing having a rearward wall, resilient means operable between the flange of said bulb and said wall for biasing said flange resiliently against said seat, electrical contact means on said bushing associated with said resilient means and the base of said bulb and switch means carried by said casing for making circuit with said contact means.

7. In a flashlight including a casing and using a bulb having a globe portion, a base portion and a flange portion intermediate said base and globe portions; a head for said flashlight, said head including as an integral part thereof a frontal reflector portion having a forward face and a rearwardly extending neck portion for connection with said casing, said reflector and neck portions being of electrical non-conducting material and said reflector portion having on its said forward face a deposited bright aluminized coating, an opening through said neck portion on the axis thereof, an annular seat in said opening normal to said axis and adjacent the reflector portion of said head for positioning the flange portion of said bulb with the globe portion of the bulb projecting outwardly through said opening within said reflector portion of said head, a bulb retaining bushing removably mounted in said opening, said bushing having a rearward wall, resilient means operable between the flange of said bulb and said wall for biasing said flange resiliently against said seat, electrical contact means on said bushing associated with said resilient means and the base of said bulb and switch means carried by said casing for making circuit with said contact means.

8. A flashlight as claimed in claim 7, including a lens secured to said reflector portion by a ring of elastomeric material.

9. In a flashlight including a casing and using a bulb having a globe portion, a base portion, and a flange portion intermediate said base and globe portions; a head for said flashlight, said head including as an integral part thereof a frontal reflector portion and a rearwardly extending neck portion threadedly connected with said casing, an opening through said neck portion on the axis thereof, means in said opening providing a seat for the flange portion of said bulb, a bulb retaining bushing carried by said neck portion in said opening and having a rearward wall, spring means surrounding said base portion of said bulb and operable between the flange portion of the latter and said wall for resiliently biasing the flange portion of said bulb against said seat, separate electrical contact means on said bushing for electrical association with said flange and base portions of said bulb, and switch means carried by said casing for making circuit with said contact means associated with said flange portion of said bulb.

10. In a flashlight including a casing and using a bulb having a globe portion, a base portion, and a flange portion intermediate said base and globe portions; a head for said flashlight, said head including as an integral part thereof a frontal reflector portion and a rearwardly extending coaxial neck portion mounted on said casing,

an opening through said neck portion on the axis thereof, an annular seat in said opening normal to said axis and adjacent to the reflector portion of said head for positioning the flange portion of said bulb with the globe portion of said bulb projecting outwardly through said opening within said reflector portion of said head, a bulb retaining bushing removably mounted in said opening, said bushing having a rearward wall, resilient means operable between the flange of said bulb and said wall for biasing said flange resiliently against said seat, another resilient means operable between said wall and the base of said bulb, electrical contact means on said bushing electrically associated with each of said resilient means, and switch means carried by said casing for making circuit with said contact for said first mentioned resilient means.

11. In a flashlight using a bulb having a globe portion, a base portion and a flange portion intermediate said base and globe portions, the combination comprising a casing, a bulb carrying head threadedly secured to said casing, said head including as an integral part thereof a frontal reflector portion and a neck portion extending rearwardly from said reflector portion into said casing, an opening in said neck portion through which a bulb may extend to a focused position in the reflector portion, means on said neck portion for positioning the flange portion of said bulb to establish said focused position, and means including bulb retaining means in said opening for resiliently effecting said positioning.

12. In a flashlight including a casing and using a bulb having a globe portion, a base portion, and a flange portion intermediate said base and globe portions, a head for said flashlight releasably secured within one end of said casing, said head including as an integral part there-

of a frontal reflector portion and a rearwardly extending neck portion, an opening through said neck portion of said head on the axis thereof defining a wall, means fixed to the wall of said opening providing a seat adjacent said reflector portion for the flange portion of said bulb and beyond which the globe portion of the bulb may project within said reflector portion, a bulb retaining bushing carried by said neck portion within said opening, said bushing having a wall rearwardly of said neck portion, resilient means operable between said bushing and said bulb for resiliently positioning said bulb flange against said seat, a pair of electrical contact means rearwardly of said neck portion at least one of which is on said bushing, one of said contact means being in electrical circuit association with said base portion of said bulb and the other in electrical circuit association with said flange portion thereof, and switch means carried by said casing for making contact with one of said contact means.

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