May 17, 1960 D. C. MUNRO 2,937,266

FLASHLIGHT

Filed Sept. 6, 1957

Fig-1

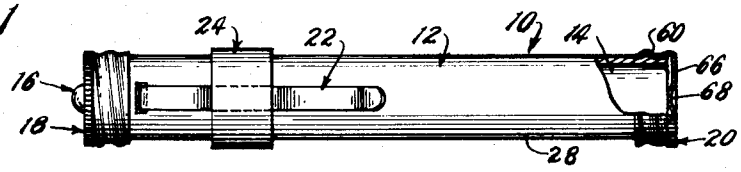


Fig-2

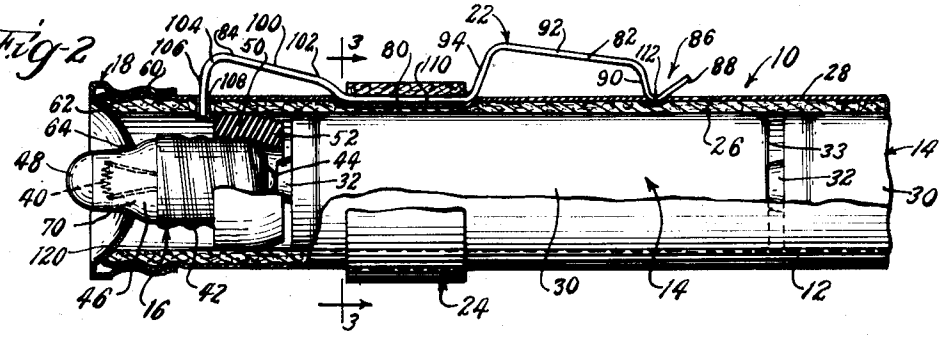


Fig-3

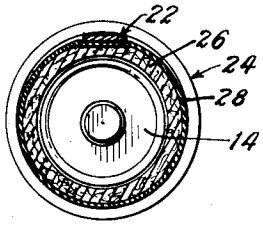


Fig-4

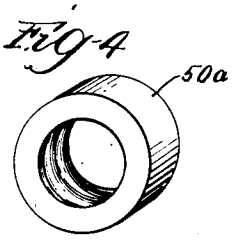
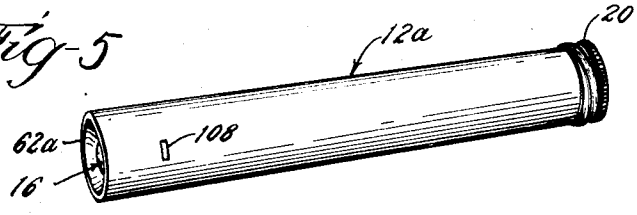


Fig-5



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FLASHLIGHT

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5 Claims. (Cl. 240—10.68)

My invention relates to a flashlight, and more particularly, to a flashlight of the pen-light type, that is adapted to be clipped, for instance, to the pocket of one's shirt or coat.

Conventional penlights and other kinds of flashlights that are held in the hand are expensive to manufacture and frequently are troublesome to operate. The reason for this is that most of the parts, such as the casing and the switch elements, are formed from expensive metals, and the switch is relatively complicated, its elements are in the main hidden from the user, and it depends on some mechanical linkage to complete the circuit required to light the flashlight.

In efforts to reduce manufacturing costs, one course of action has been to reduce the size of the flashlight, which results in a less effective beam of light being provided, and presents difficulties in switch design. However, so far as I am aware, the industry has continued to employ the conventional complicated and hidden switch designs that inherently maintain manufacturing costs while at the same time are highly susceptible to corrosion and the like which cannot be detected by the flashlight owner, and which inevitably lead to malfunctioning of the flashlight.

A principal object of my invention is to provide a simplified flashlight that permits a marked reduction in manufacturing cost and yet provides a beam of light that is comparable to that of larger conventional flashlights.

Another principal object of my invention is to provide an improved switch arrangement that exposes the principal elements thereof to the user, and materially simplifies the design of switches for flashlights in general.

A further object of the invention is to improve on and simplify the design of flashlights in general.

Other objects, uses, and advantages will be obvious or become apparent from a consideration of the following detailed description and the application drawings.

In the drawing:

Fig. 1 is a plan view of a preferred embodiment of the invention, partially in section;

Fig. 2 is a longitudinal cross-sectional view through the flashlight shown in Fig. 1 illustrating the principal parts thereof, parts being broken away for clarity of illustration;

Fig. 3 is a cross-sectional view along line 3—3 of Fig. 2;

Fig. 4 is a perspective view of a modified flashlight bulb centering ring that may be employed in the flashlight of Figs. 1 and 2; and

Fig. 5 is a perspective view of the modified form of casing for the flashlight.

Reference numeral **10** of Figs. 1 and 2, indicates a preferred embodiment of the invention which includes a tube or casing **12** that carries one or more batteries **14** and electric light bulb **16**, top end cap **18** and bottom end cap **20** for casing **12**, resilient clip and switch member **22**, and securing ring **24**.

The casing **12** in the illustrated embodiment is formed from three ply kraft dielectric paper formed in any suitable manner to the rounded shape (in the illustrated embodiment) indicated in Fig. 3. The kraft paper forms a relatively rigid but deformable inner layer **26** on the outer surface of which is secured a layer of metal foil **28**. The foil should have good electrical conductance properties and should extend from the bottom end of the casing into contact with the member **22**, though it need not entirely surround the casing. The foil material may be, for instance, the conventional paper-backed aluminum foil that is readily available on the market, the paper backing being on the inner side of the foil layer. Alternately, the casing **12** may be formed from a plastic material metallized to provide the electrical circuiting required.

The battery or batteries **14** may comprise any conventional type and ordinarily include a metallic casing **30** formed with the conventional upper terminal **32**. The casing **30** forms the other terminal of the battery, contact with other batteries on the bottom of the flashlight usually being made at the bottom **33** of the battery. In the illustrated embodiment, the usual paper or cardboard wrapping is omitted in interests of economy.

The bulb **16** may comprise any conventional form of pen-light bulb that includes an element **40** connected by appropriate leads to casing **42** (which is threaded in the illustrated embodiment, but need not be) and terminal **44**, respectively. The bulb **16** ordinarily includes a transparent flashlight globular enclosure **46** including a bulbous end **48** that magnifies light rays passing outwardly of the bulb.

The bulb **16** carries a deformable resilient centering ring **50**, which is received on the screw threaded portion of the illustrated form of bulb **16**. The ring **50**, which may be formed from rubber or rubberlike materials, is preferably proportioned so that it slidingly engages the interior surface of casing **12** and yet provides a centering action on the cylindrical portion **42** of the bulb. As indicated in Fig. 2, the centering ring **50** is preferably positioned so that it does not entirely overlie the portion **42** of the bulb, but includes a portion **52** that extends over the terminal **44** of the bulb. This gives the ring **50** a tapered configuration which facilitates the insertion of the bulb and ring within the casing from the front or top end of the flashlight.

Alternately, the ring **50** may take the form of fiber washer **50***a* shown in Fig. 4, or even similarly shaped metal washers may be employed.

The top cap **18** in the illustrated embodiment comprises an annular threaded portion **60** that is integrally united with a dished reflector portion **62** formed with a central perforation **64**. The bottom cap **20** likewise includes an annular threaded portion **60**, but also includes a disc-like portion **66** formed with an inwardly extending indentation **68** that is adapted to abut against the bottom of the adjacent battery **14**, as indicated in Fig. 1.

Preferably caps **18** and **20** are formed from a relatively hard substance such as a metal or an appropriate plastic so that when threaded on the ends of casing **12**, they form their own screw threading in the casing. As the cap **18** is screwed into place, the end **48** of bulb **16** extends outwardly of the reflector portion **62** until the reflector portion **62** bears against the enlarged portion **70** of bulb enclosure **46**. This provides a second centering action on the bulb **16**. As the cap **20** is screwed into place on the casing **12**, the indentation **68** is placed into electrical conductive engagement with the bottom of the adjacent battery **14**. Of course, cap **20** should be formed from or include a material that conducts electricity, since it forms part of the electrical circuit of the flashlight.

The act of screwing caps **18** and **20** on casing **12** brings the bulb **16** and batteries **14** in electrical contact, which eliminates the need for the conventional spring between cap **20** and the lower battery. Where cap **20** is to be provided with a rounded end, however, a spring may be employed to establish the electrical circuit between the end battery and cap **20**.

The clip and switch member **22** comprises an elon-

gated element formed, from spring steel, or the like, into the configuration generally illustrated in Fig. 2. It will thus be seen that the member **22** includes a relatively flat center portion **80** that separates two outwardly bent portions **82** and **84**. The portion **82** includes end portion **86** having a generally V-shaped configuration, which, when the member **22** is applied to casing **12**, positions leg **88** of end **86** at a relatively small angle with respect to casing **12** and leg **90** of end **86** at a relatively large angle with respect to casing **12**. Leg **90** merges into an upwardly inclined portion **92** that in turn merges into a connecting portion **94** that is integrally united with central portion **80**.

The portion **84** of the clip member **22** comprises an upwardly inclined segment **100** having a slight bend formed as indicated at **102**; portion **84** is turned at approximately a right angle at **104** to provide a transversely extending contact arm **106**. Arm **106** is aligned with a perforation **108** formed in the casing adjacent the cylindrical portion **42** of bulb **16**.

The member **22** is retained on casing **12** by retaining ring **24**, which is preferably so proportioned that it closely engages the outer surface of casing **12**. The ring **24** is applied to casing **12** before cap **18** and with the portion **84** of the clip member held flat against the casing (end **106** of member **22** being previously inserted in perforation **108**). When the ring is positioned as shown in Fig. 2, the portion **94** and bend **102** of the clip member bend to hold the clip member in the position shown with respect to the ring **24**. Ring **24** holds portion **80** of clip member **22** against foil layer **28** of the casing to establish the electrical contact between these elements of the flashlight.

The casing **12** may be indented as at **110** and **112** where the clip member **22** contacts same to maintain the clip member in the position illustrated. In addition, portion **80** may be curved away from casing **12** at its center portion so that ring **24** urges portion **80** into closer contact with the casing at the ends of portion **80**. This together with perforation **108** provides three effective points of support for the clip member, and enhances the electrical connection between the foil layer **28** and the clip member.

The ring **24** may be formed from any suitable material, but preferably is either light in color or luminous so that the flashlight may be easily located in the dark. It may be made from the same material forming layer **26** of casing **12**, but in any event it should be semi-rigid and relatively strong.

The device **10** may be assembled by first placing the battery or batteries **14** in the casing **10** in the manner indicated in the drawings and applying the bottom cap **20** to the casing. The bulb **16** is then applied to ring **50** to dispose these parts in the relation indicated in Fig. 2. The tapered end or portion **52** of ring **50** is then inserted into the top end of the casing **12** and the bulb pushed into the casing until terminal **44** contacts the terminal **32** of the upper battery **30**. The clip member **22** is then applied to the casing in the manner indicated in Fig. 2, with portion **106** thereof extending through perforation **108** that is formed in casing **12**. The member **22** is followed by top cap **18**, applied to casing **12** by turning same on the casing; cap **18** is preferably turned until the rim of perforation **64** bears against the cover **46** of the bulb, as described above.

The clip member **22** forms the switch of the flashlight, and completes the circuit between the foil layer **28** and the bulb **16**. The electrical circuit is thus from the battery through the bottom cap **20** to the foil layer **28** and thence from the foil layer through clip member **22** to the cylindrical portion **42** of bulb **16**, the filament **40**, the bulb terminal **44**, and back to the battery **14**.

Preferably, the clip member **22** is tensioned so that portion **84** normally assumes the position indicated in Fig. 2, and portion **82** bears against the casing **12** at its end **86**. When one desires to turn the flashlight on, the portion **100** of the clip member **22** is pressed to bring the contact arm **106** into contact with the cylindrical portion **42** of bulb **16**. If one desires to maintain the beam of light without pressing on the clip member **22**, one merely slides the retaining ring **24** to the left of Fig. 2 to bring portion **100** of clip member **22** underneath ring **24**; this holds the end **106** against the cylindrical portion **42** of bulb **16**. The switch is released and the light turned off by merely forcing ring **24** to the right to position same as shown in Fig. 2, whereupon the inherent springiness of the material from which clip member **22** is formed moves arm **106** to the position shown in Fig. 2, thus breaking the electrical circuit.

The outwardly bent portion **82** of clip member **22** forms a clamping arm that permits the light **12** to be secured to one's shirt or coat pocket. The relatively small angle that leg **88** of end **86** makes with the casing facilitates the entry of the cloth that forms the pocket between the clip and the casing, while the relatively large angle that leg **90** of end **86** makes with casing **12** tends to preclude removal of the clip from one's pocket by bunching up the cloth material as the cloth starts to move outwardly of the clip member, and thus insures against accidental removal of the light from its desired position in one's pocket.

When arm **106** is pressed against bulb **16**, bulb **16** is maintained in its position by ring **50** and cap **18**, which insures that the bulb will always be so held that the electrical circuit will be preserved. As the reflector remains in contact with the bulb, the proper relationship between the bulb and the reflector is maintained as long as the flashlight is in assembled relation. Furthermore, reflector portion **62** extends from the end of cap **18** all the way to and into contact with the bulb **16**, which provides an extended light reflecting surface not found in conventional flashlights.

The foil is secured to the casing **12** by any suitable form of adhesive which is preferably of a waterproof type.

As described above, the batteries **14** may be of any standard type, but in accordance with the principles of my invention, the usual paper or cardboard wrapping of the battery may be omitted since the electrical circuit of the flashlight is on the outside of casing **12**. This materially reduces the cost of producing batteries **14**.

The outer surface **120** of reflector **62** may be coated with a highly reflective substance that will increase the amount of light reflected. The coating applied may be of chrome, tin or nickel plating in form.

The bend **102** in portion **84** of clip member **22**, in addition to its centering action on ring **24**, prevents the ring **24** from accidentally being forced over the portion **100** of clip member **22** and thus accidentally turning the flashlight on. Preferably, the end **106** is positioned not quite at 90 degrees with respect to portion **100** so that its tip moves toward the bulb **16** as portion **100** is pressed toward casing **12**.

Fig. 5 illustrates a modified form of casing or tube **12*a*** which is formed entirely of metal and includes a reflector portion **62*a*** that is given the same shape as reflector **62**, but is made integral with the casing **12*a***. The bottom end of casing **12*a*** is preferably screw-threaded to receive a cap **20**, similar to cap **20** of Fig. 1. Casing **12*a*** is formed with perforations **108** to receive an arm of a clip member **22**. The identations **110** and **112** are omitted in this embodiment of the invention, but may be employed if so desired.

Alternately, cap **20** may be made integral with casing **12*a*** and cap **18** employed in place of integral reflector portion **62*a***. I also contemplate that both caps may be omitted and the ends of the casing **12*a*** machined to close the ends of the casing against the bulb and the batteries; a metal spinning operation would satisfactorily

accomplish this, and, of course, the bulb and batteries would be permanently sealed within the casing.

The internal elements of a flashlight employing casing **12***a* are inserted from the bottom end of same in proper order. The battery or batteries employed would have to have the conventional wrapping, and centering ring **50** should be of the non-conductive type in this embodiment of the invention. Member **22** and ring **24** may be applied to casing **12***a* in the same manner as described above.

My invention has or provides a number of important advantages. For instance, my flashlight is obviously composed of less elements than are normally found in conventional flashlights. By employing a penlight bulb with a reflector, the beam of light that is thrown off is particularly effective. Even though the batteries are not biased toward the bulb by the conventional spring arrangement, I am able to provide an effective and positive electrical contact between the bulb and the battery. An effective and positive electrical contact is also provided at the switch, and it will be noted that the electrical contact made by the switch is not dependent upon the action of some spring member or members, or linkage of members, that are unseen by the user. By making the principal elements of my switch visible, it is apparent that all defects, if occurring, may be readily detected, and the simplified nature of the switch practically eliminates the occurrence of defects.

By employing the simplified construction illustrated, my flashlight is or may be much shorter and lighter than conventional lights. It is obvious that the construction is much simplified when compared to conventional flashlights, and this adapts the illustrated embodiments of the invention for premium item use, as for instance, when inserted in packages of cereal and the like. Also, the simplified form of construction adapts the flashlight for use as an educational device which will aid youngsters in learning the principles of electricity and gaining dexterity in the use of their hands as well as in acquiring mechanical ability.

While the illustrated embodiments of the invention are found in cross-sectional configuration, obviously other configurations may be employed.

The foregoing description and the drawings are given merely to explain and illustrate my invention, and the invention is not to be limited thereto, except insofar as the appended claims are so limited since those skilled in the art who have my disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

I claim:

1. An electric flashlight comprising a tube including an electrical current conductive portion forming at least part of the outer surface of said tube, an electric battery received in said tube, a bulb mounted in said tube at one end thereof and in electrical contact with one terminal of said battery, said electrical conductive portion of said tube being in electrical contact with the other terminal of said battery, said bulb including a generally cylindrical portion forming one contact of the bulb, a base portion forming the other contact of the bulb and a transparent globular portion covering the illuminating element of the bulb, said other contact of said bulb being in electrical contact with said one terminal of said battery, a centering ring received about said cylindrical portion of said bulb, said ring being concentrically and complementarily arranged within said tube to center said bulb within said tube with said other contact of said bulb in electrical contact with said one terminal of said battery, an electrical current conductive spring member contacting said portion of said outer surface of said tube and extending longitudinally of said tube from said one end thereof toward the other end thereof, said member including a relatively flat portion extending parallel to said tube and separating two outwardly bent portions, one of said outwardly bent portions including an inwardly directed projection that extends transversely of said tube, said tube being formed with a perforation in alignment with said one contact of said bulb through which said projection extends to contact said one contact of said bulb, said projection of said spring member being biased away from said bulb, a clamping sleeve slidably received about said tube with said relatively flat portion of said spring member being received between said sleeve and said tube, said sleeve being proportioned to clamp said member to said tube to hold said spring member in engagement with said tube, the other of said outwardly bent portions including an end portion that extends toward the other end of said tube and that resiliently bears against said tube when said member is received between said ring and said tube to form a clip for securing the flashlight to one's pocket or the like, and said one end of said tube including a cap member formed with a generally concave reflector portion facing outwardly of said tube and defining a central perforation through which said globular portion of said bulb extends from within said tube, with the portion of said reflector portion defining said central perforation contacting said globular portion of said bulb to effect a centering action thereon, whereby said one bent portion of said spring member may be pressed to place said projection in electrical contact with said one contact of said bulb to light the flashlight, and said centering ring and said cap member maintain said bulb centrally disposed within said tube, said one outwardly bent portion of said spring member being inclined away from said tube at a relatively small angle, whereby said sleeve may be moved thereagainst to partially overlie said one bent portion of said spring member to hold said inwardly directed projection in contact with said one contact of said bulb.

2. The flashlight set forth in claim 1 wherein said tube is formed from a relatively rigid but deformable material, and wherein said other end of said tube is formed with a cap member, the last mentioned cap member being in electrical contact with said other terminal of said battery and said portion of said tube, said cap members comprising screw threaded elements that may be turned onto said tube to deform said tube whereby said cap members are affixed to said tube.

3. The flashlight set forth in claim 1 wherein said tube is formed from a relatively rigid material, said cap member being integrally united with said tube, said tube including a second cap member at its other end, said second cap member being in electrical contact with said other terminal of said battery and said portion of said tube, and means for securing said second cap member to said tube.

4. The flashlight set forth in claim 1 wherein said centering ring is proportioned to be enlarged when received about said cylindrical portion of said bulb, said ring being only partially received on said cylindrical portion of said bulb whereby said ring is formed with a tapering end portion that facilitates insertion of said ring and said bulb within said tube.

5. The flashlight set forth in claim 1 wherein said flat portion of said spring member and said end portion of said other bent portion thereof are received in indentations formed in said tube.

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