Jan. 17, 1956 G. N. BOLINGER 2,731,545

FLASHLIGHT

Filed Aug. 25, 1952

Fig. 1.

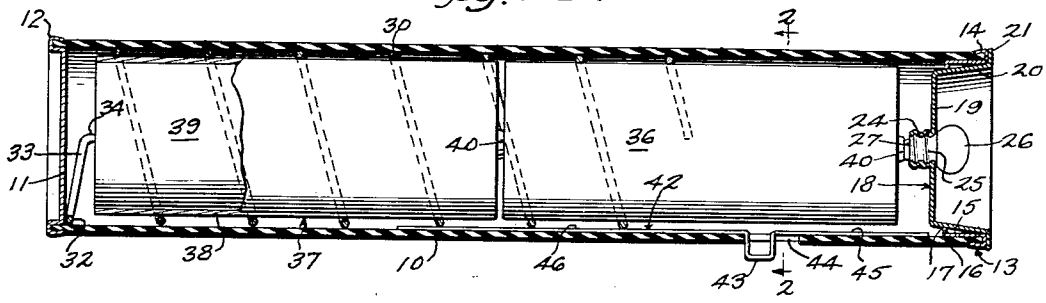


Fig. 2.

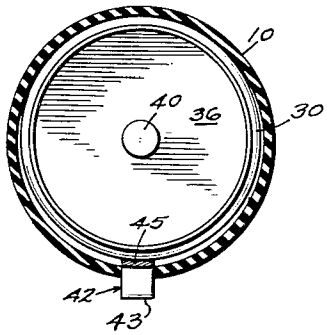


Fig. 3.

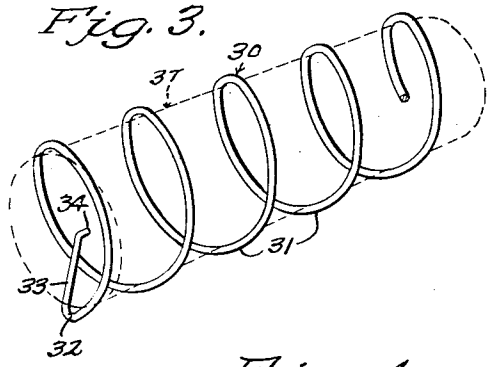


Fig. 4.

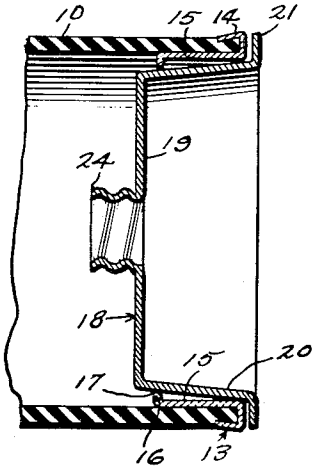


Fig. 5.

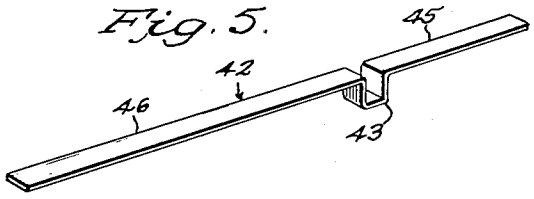
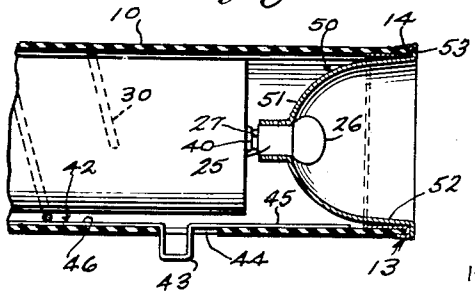


Fig. 6.



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FLASHLIGHT

George Noel Bolinger, Shelbyville, Ill.

Application August 25, 1952, Serial No. 306,099

7 Claims. (Cl. 240—10.68)

This invention relates to a flashlight, and more particularly to a flashlight structure which is extremely simple in construction and economical to manufacture.

In my copending application Serial No. 297,850, filed July 9, 1952, I have disclosed a simplified type of flashlight construction wherein the case of the flashlight forms, in effect, a carton in which the batteries are sold and which is so simple and economical to manufacture that, upon the exhaustion of the batteries, it is wholly practicable to discard the flashlight and to purchase a new one. In my copending application referred to, I have disclosed a highly simplified form of switch device for closing a circuit through the light bulb. A similar switch device is employed with the present construction and forms, per se, no part of the present invention, but is utilized in the present device in a new and novel manner.

An important object of the present invention is to provide a highly simplified type of flashlight construction wherein the case may be economically formed of such material as cardboard and the like, and in which the batteries are readily replaceable without discarding the flashlight as a whole.

A further object is to provide such a flashlight wherein a simplified type of switch device is employed in combination with a novel means for maintaining the switch device in proper position in the case, and which single means performs at least one additional function.

A further object is to provide such a device wherein a single spring element in the flashlight case performs three functions, namely, the holding of the switch element in proper position, the establishment of electrical connection between the switch and the base of the battery remote from the bulb, and the urging of the batteries in a direction toward the bulb to maintain at all times efficient electrical connection between the base contact of the bulb and the center contact of the adjacent battery.

A further object is to provide such a flashlight wherein all of the parts may be produced at a relatively low cost; wherein all of the parts are so simplified as to impart to the flashlight a high degree of ruggedness in use, and wherein the parts may be readily assembled.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawing I have shown two embodiments of the invention. In this showing:

Figure 1 is an axial sectional view through the flashlight, parts being shown in elevation and parts being broken away;

Figure 2 is a transverse section on line 2—2 of Figure 1;

Figure 3 is a fragmentary perspective view of the spring device used in the flashlight, one of the batteries being shown in dotted lines within the spring device;

Figure 4 is an enlarged fragmentary sectional view of the reflector end of the device with the bulb and battery omitted, and showing the reflector partially removed from the case;

Figure 5 is a detail perspective view of the switch element; and

Figure 6 is a fragmentary sectional view, similar to Figure 1, showing a modified type of reflector.

Referring to Figure 1, numeral 10 designates the body of the flashlight case, which may be made of a section of tubular material of any desired type, such as cardboard, fiber, or other nonconducting material. It is preferable that relatively heavy cardboard be employed in the interest of economy in manufacture. It will be noted that the body 10 is cylindrical from end to end and may be cut to the desired length from any suitable tubular material, according to the number of batteries to be used. One end of the case is permanently closed by a cap 11, which may be made of metal, plastic, or any other suitable material. The cap 11 is provided with a peripheral bead 12 to be rolled over or otherwise permanently connected to the end of the body 10, and may be cemented in position if desired.

At its opposite end, the body 10 is provided with a ferrule indicated as a whole by the numeral 13 and beaded as at 14 for connection with the adjacent end of the body 10 in the same manner as the bead 12. Inwardly of the bead 14, the ferrule 13 is provided with an inwardly projecting cylindrical portion 15 fitting within the body 10 and terminating at its inner extremity in an inturned annular flange 16, provided with a central circular opening 17.

A reflector element 18 is employed with the form of the device shown in Figure 1 and may comprise a flat body portion 19 and an outwardly extending frusto-conical flange 20 which increases very slightly in diameter toward the associated end of the body 10. The flange 20 is adapted to have a pressed-in wedge fit in the opening 17 to be frictionally maintained in position, and the outer extremity of the reflector element is provided with an annular flange 21 extending over the bead 14. The reflector member will be made preferably of metal and of thin gauge so as to possess an appreciable degree of resiliency whereby the flange 21, if necessary, may flex slightly to insure inward movement of the frusto-conical flange 20 to the extent necessary for this element to wedge tightly in the element 17 and hold the reflector element in position until it is desired to remove it.

Axially thereof, the reflector element may be provided with a suitable socket 24, shown in the present instance as being threaded to receive the base 25 of a light bulb 26 having a base contact 27.

Within and substantially fitting the body 10 of the case is a helical spring 30. This spring is of substantial length and comprises successive helical turns 31, and the end of the spring remote from the bulb 26 is bent as at 32 and then extends radially inwardly as at 33 to terminate in an axial projection 34 for a purpose to be described. It will be noted that the bend 32 seats against the cap 11, as shown in Figure 1, and the spring portion 33 inclines inwardly toward the axis of the case.

In the present instance the flashlight is shown as being of such size and length as to contain two conventional flashlight batteries 36 and 37, which may be arranged in the usual cardboard housings 38. Each battery has the usual metal casing 39, and center contact 40 at one end of the battery. As shown in Figure 1, the projecting end 34 of the spring bears against the base of the shell or casing 39 of the battery 37.

The switch element for the device is shown in Figures 1 and 5 and is indicated as a whole by the numeral 42. This switch device is formed of a single flat strip of metal offset between its ends, as at 43, to provide a finger piece which projects through a slot 44 in the casing 10, as shown in Figure 1. The offset 43 divides the switch element into a relatively short forward shank 45 and a relatively long

rear shank 46, the latter of which extends between the spring 30 and the adjacent portion of the casing body 10. The switch element normally occupies the position shown in Figure 1 with the finger piece 43 at the rear extremity of the slot 44, that is, at the end of such slot remote from the light bulb 26.

In Figure 6 of the drawing I have shown a slightly modified form of the invention in which those parts which are identical with the parts of the device shown in Figures 1–5 inclusive have been indicated by the same reference numerals. In the modified form of the device, the reflecting element is indicated by the numeral 50 and the rear portion of this reflecting element, indicated by the numeral 51, is substantially parabolic. At its forward extremity, the parabolic portion of the reflector merges into a frusto-conical portion 52, similar to the portion 20 of the reflector previously described, and the reflector 50 likewise is provided with an annular flange 53 overlying the bead 14.

Operation

The casing body 10 is cut off to the desired length, as determined by the number of batteries to be contained in the device. It also will be aparent that, if the reflector 50 of Figure 6 is to be employed, a slightly longer casing will be necessary. The cap 11 and ferrule 13 will be formed by any desired method and assembled upon the ends of the body 10 in any suitable or practicable manner. The spring 30 may be inserted in the device after the ferrule 13 is seated in position, but preferably is inserted prior to the placing of the ferrule 13. The spring is pushed inwardly to the position shown in Figure 1 and, if not pushed fully to the position in which the bend 32 seats against the cap 11, the insertion of the batteries 36 and 37 will accomplish this purpose. The external diameter of each battery will be slightly less than the diaceter of the opening 17 to permit the later removal and replacement of the batteries without removing the ferrule 13.

As previously stated, the switch element 42 is similar to and may be substantially identical with the switch element shown in my copending application Serial No. 297,850, filed July 9, 1952, and this switch preferably, but not necessarily, is placed in position prior to the insertion of the spring 30, and it will be apparent that the spring engages the shank portion 46 of the switch to maintain the switch properly in position against the adjacent wall of the body 10. After the elements have been assembled, the proper bulb 26 will be screwed into position. The flashlight is now ready for operation, and the bulb may be illuminated by pushing the finger piece 43 to the right, as viewed in Figure 1, to engage the end of the shank portion 45 with the ferrule 13. The circuit will be completed through the batteries in the usual manner, through the spring end 34, through the body of the spring 30, switch element 42, ferrule 13, reflector 18, the shell 25 of the bulb 26 and thence through contacts 27 and 40. The circuit may be broken merely by pulling back on the finger piece 43.

It will be apparent that the spring 30, while only a single element in itself, performs three separate functions. The spring holds the switch element 42 against the casing 10 and frictionally resists movement thereof to hold the switch against accidental movement from any given position thereof. The spring also serves to provide electrical connection between the base of the battery 37 and the switch element, and the spring portion 33 exerts an axial force against the battery 37 to maintain electrical contact between the center contact 40 of the battery 37 and the base of the battery 26 and to maintain the contact 40 of the battery 36 in electrical engagement with the base contact 27 of the bulb.

The spring coils 31 fit relatively snugly in the flashlight case but fit relatively loosely around the batteries, so that the latter are readily urged toward the right, as viewed in Figure 1, by the spring portions 33 and 34. Accordingly, these spring portions need not exert very great force against the battery 37, and the spring tension for this purpose is substantially less than the friction maintaining the frusto-conical reflector portion 20 in the opening 17. The wedging action which holds the reflecting element in position, therefore, is wholly effective against the tension of the spring portions 33 and 34 while at the same time readily permitting the removal of the reflector by a screw driver or similar implement inserted between the flange 21 and bead 14 to remove the reflector as suggested in Figure 4.

When the batteries are exhausted, they may be replaced by inserting a suitable implement between the flange 21 and the bead 14 to loosen the reflector element from the opening 17. The reflector and bulb may be removed, the batteries dropped out, new batteries placed in position, and the reflector 18 replaced.

The form of the device shown in Figure 6 is identical with the form of the device shown in Figures 1–5, inclusive, except for the different formation of the reflector 50 where it is desired to provide a concentrated beam of light. In the modified form of the invention, the bulb is shown as having a base connection with the reflector 50 of the pin and slot type, which of course is conventional.

From the foregoing, it will be apparent that the flashlight as a whole may be economically formed, there being no expensive or intricate parts involved. Accordingly, the flashlight is rugged and long-lasting in construction.

I claim:

1. A flashlight comprising an insulating case, a cap structure for each end of said case, one of which cap structures comprises a reflector having means for supporting therein a light bulb with its base contact engaging the center contact of a battery in said case, a switch element having a straight shank portion mounted in said case and having a finger piece projecting therefrom for longitudinal movement of said switch element into electrical engagement with said one cap structure, and a single spring mounted in said case and comprising a coil substantially fitting within said case said shank portion of said switch element lying between said case and said coil and contacting with said coil, said spring having a bend seated against the other cap structure and having an end projecting from said bend radially inwardly and away from such other cap structure in engagement with the end of a battery in said case to urge said center contact into engagement with the base contact of the bulb.

2. A flashlight comprising an insulating case, a cap structure for each end of said case, one of which cap structures comprises a reflector having means for supporting therein a light bulb with its base contact engaging the center contact of a battery in said case, a switch element mounted in said case and having a finger piece projecting therefrom for longitudinal movement of said switch element into electrical engagement with said one cap structure, and a coil spring arranged in said case and extending from the other cap structure throughout a substantial portion of the length of said case, said switch element having a portion lying between said case and said coil spring and having electrical contact with the latter, said spring having an integral end portion seating against said other cap structure and terminating in a substantially radially inwardly extending extremity engaging the end of an adjacent battery and flexed to transmit a longitudinal force thereto to maintain engagement between said center contact and the base of the bulb.

3. A flashlight comprising an insulating case having a cap structure at each end, one of which comprises a reflecting element having means for supporting therein a light bulb having a base contact engageable with the center contact of a battery arranged in said case, a switch element arranged in said case and comprising a single strip of material having an offset finger piece intermediate its ends and said case having a longitudinal slot through

which said finger piece projects, one end of said switch element being movable longitudinally of said case into electrical contact with said one cap structure and the other end of said switch element lying against the inner surface of said case, and a single spring reacting between the other cap structure and the bottom of an adjacent battery to urge said center contact into engagement with the base contact of the bulb, said single spring having a coil portion substantially fitting said case, said other end of said switch element lying between said case and said coil portion to establish electrical contact with a plurality of turns of said coil portion, said switch element being slidable relative to said coil portion to maintain electrical contact therewith in any longitudinal position of said switch element.

4. A flashlight comprising an insulating case having a cap structure at each end, one of which comprises a reflecting element having means for supporting therein a light bulb having a base contact engageable with the center contact of a battery arranged in said case, a switch element arranged in said case and comprising a single strip of material having an offset finger piece intermediate its ends and said case having a longitudinal slot through which said finger piece projects, one end of said switch element being movable longitudinally of said case into electrical contact with said one cap structure and the other end of said switch element lying against the inner surface of said case, a helical spring arranged within and substantially fitting said case, said spring comprising a plurality of helical turns extending from the other cap structure throughout a substantial portion of the length of said case, said spring having a bend seating against the other cap structure and terminating in a substantially radially inwardly projecting integral end contacting with the end of an adjacent battery to exert force thereagainst longitudinally of said case to maintain said center contact in engagement with the base contact of the bulb, said other end of said switch element being seated against the inside of said case by said spring and being slidable over the latter longitudinally of said case.

5. A flashlight comprising an insulating case, a cap closing one end of said case, a ferrule fixed to the other end of said case and having an inturned flange forming an annular opening, a reflecting element having a slightly tapered annular portion movable into wedging engagement with said flange to be frictionally maintained in position therein, said reflecting element having an axial opening to receive and support a light bulb having a base contact engageable with the center contact of a battery in said case, a longitudinally slidable switch element within said case having a portion projecting therethrough and manually movable to move said switch element longitudinally of said case, said ferrule and said reflector constituting a cap structure and one end of said

switch element being electrically engageable with such cap structure upon longitudinal movement of said switch element in one direction, and means for establishing electrical connection between the other end of said switch element and the end of a battery adjacent said cap, said means comprising a resilient element reacting between said cap and the end of an adjacent battery to maintain electrical engagement between said center contact and the base contact of said bulb, the force of said spring element being less than the frictional resistance to movement of said reflecting element out of said flange.

6. A flashlight comprising an insulating case, a cap closing one end of said case, a ferrule fixed to the other end of said case and having an inturned flange forming an annular opening, a reflecting element having a slightly tapered annular portion movable into wedging engagement with said flange to be frictionally maintained in position therein, said reflecting element having an axial opening to receive and support a light bulb having a base contact engageable with the center contact of a battery in said case, a longitudinally slidable switch element within said case having a portion projecting therethrough and manually movable to move said switch element longitudinally of said case, said ferrule and said reflector constituting a cap structure and one end of said switch element being electrically engageable with such cap structure upon longitudinal movement of said switch element in one direction, and means for establishing electrical connection between said other end of said switch element and the end of the battery adjacent said cap, comprising a helical spring having a plurality of turns extending throughout a substantial portion of the length of said case, said turns of said spring maintaining said other end of said switch element in engagement with said case and being in electrical contact with said other end of said switch element and frictionally resisting longitudinal movement thereof to maintain said switch element in any adjusted position.

7. A flashlight constructed in accordance with claim 6 wherein said helical spring is provided with a bend seating against said cap and terminating in a substantially radial inner extremity engaging the adjacent end of a battery to maintain said center contact in engagement with the base contact of the bulb.

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