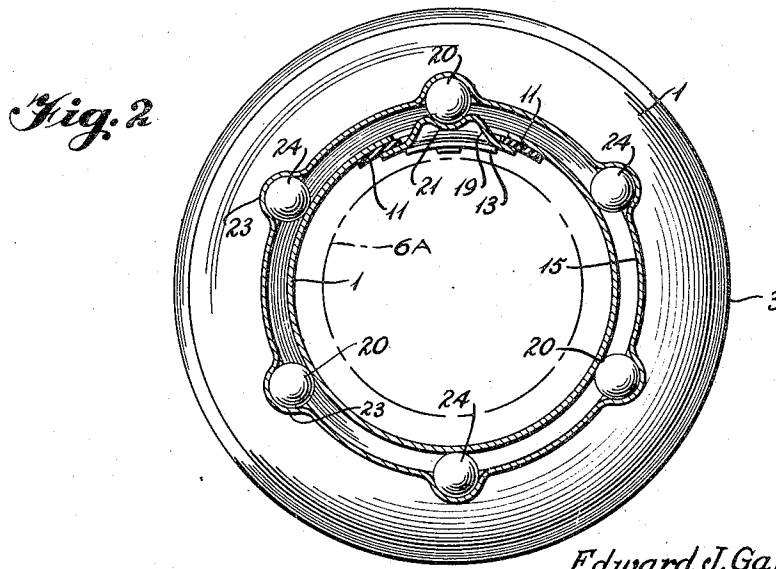


E. J. GARLAND
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INVENTOR

Edward J. Garland

BY

Beale and Jones
ATTORNEYS

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FLASHLIGHT CONSTRUCTION

Edward J. Garland, Shrewsbury, Mass., assignor, by
mesne assignments, to The Electric Storage Battery
Company, Philadelphia, Pa., a corporation of New
Jersey

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This invention relates to a novel electrical switching mechanism, and particularly to a novel electrical switching mechanism adapted for use with a tubular flashlight casing.

Flashlights now commonly in use are customarily provided with a push-button type of switch. In a common type of switch, it is usually necessary to depress a small button in order to complete the electrical circuit. A slide may then be advanced generally toward the front end of the flashlight to lock the button in the depressed position and keep the circuit of the flashlight in a closed position, for provision of a beam of light continuously. A major disadvantage of switches of this type resides in the difficulty of locating and maneuvering the switch in the darkness, and in emergency situations generally.

A principal object of the present invention is to provide a novel type of flashlight switching mechanism which will be very easy to locate and operate in the darkness and under other disadvantageous conditions. Another object of this invention is to provide a switch for a flashlight which is a major feature in the silhouette or contour of the flashlight, readily discernible to the touch and upon visual inspection, and which may be a desirable and attractive feature in the appearance of the flashlight casing. Still another object of the invention is to provide a ring switch for a tubular flashlight casing which is operated by rotation of the ring, and which is so constructed as to lock in either the "on" or the "off" position.

These and other objects of the invention which will become more readily apparent from the following description, are achieved by providing a tubular flashlight casing with a rotatable ring adjacent the head of the flashlight casing. Seated within the ring are a plurality of bearings, alternately conductive and non-conductive, which bear against the ring and the wall of the flashlight casing. At one point on the circumference of the wall of the casing, an electrical contact strip is exposed to contact with the bearings through an aperture in the wall. The contact strip may be in electrical contact with the top terminal of the foremost dry cell in the casing, through electrical connections through the lamp holder and the reflector assembly. The rotating ring is desirably in electrical connection with the base terminal of the rearmost dry cell of the flashlight through contact of a bottom spring in the casing with the bottom of the dry cell. Controlled rotation of the ring may bring any one of the conductive bearings, individually, into electrical connection with the exposed contact strip, thereby allowing completion of the electrical circuit and energizing the flashlight.

The familiar advantage of locking the switch in either the "on" or the "off" position may be obtained by providing a recessed seat in, and a spring-bias for, the contact strip. The engagement between the bearing seated within the contoured recess in the contact strip and the

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recessed seat in the ring provides resistance to any undesired rotation of the ring.

The many advantages of the ring switch of this invention, and the details of its construction, may be best understood by reference to the drawings, in which:

Fig. 1 is a side elevational view of a flashlight assembly containing the ring switch of this invention, in partial section;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Referring now in detail to the drawings, the tubular flashlight casing 1 may be of a conventional type opening at the lens end only, upon removal of the lens cap 3. Within the flashlight casing there may be disposed in conventional relationship a reflector assembly 4 containing a light bulb and a contact base 5, making electrical contact with the top terminal of a conventional dry cell 6A. Electrical contact with the base terminal of the rearmost dry cell 6B is provided through a contact spring 7, which is also in electrical contact with the flashlight casing 1. Although the flashlight casing 1 may be constructed of any desired conductive material, the preferred material is a sheet metal susceptible of a high polish on the exterior for an attractive appearance, and coated with copper on its interior surface for enhanced electrical conductivity. The flashlight casing may also be constructed of non-conductive synthetic plastic materials, where suitable provision is made for electrical contact between the proper elements of the switch mechanism and the base terminal of the rear dry cell.

The exterior electrical connection between the base terminal of the rear cell 6B and the top terminal of the front cell 6A is completed through the switching mechanism of this invention, a preferred embodiment of which is illustrated in partial section in Fig. 1. In this embodiment of the invention, the undersurface of the reflector bowl 4 is copper-coated and is in electrical contact with one terminal of the light bulb, the other terminal of the light bulb being in electrical connection with the terminal of the front dry cell 6A. The copper coating on the reflector bowl thus is an integral part of the electrical switch circuit. A permanently positioned spring-like electrical connector 9 provides resilient contact with a conductive metal such as a copper coating on the undersurface of the reflector bowl, and extends rearwardly into the tubular casing, where it is securely positioned by a pair of rivets 10 which bridge the rotatable ring and its associated elements. The electrical connector 9 is insulated from the casing by an interposed fiber strip 11 which is secured in position on the electrical connector 9 by a pair of rivets 12. The bridging rivets 10 may also be employed to secure the fiber strip 11 in position where it extends into the casing adjacent the switch mechanism. If desired, an additional fiber strip 13 may also be secured by the rivets on the inner surface of the electrical connector 9, to prevent accidental electrical contacts of an undesired nature, and to shield and support the electrical connector 9.

At one point on the periphery of the flashlight casing 1, the wall of the casing is apertured, and the electrical connector 9 is bent upwardly and outwardly through the aperture to form a struck-up contact strip 19. At this point the fiber insulating strip 11 is also apertured so as to provide unrestricted movement of the contact strip 19 through the aperture in the flashlight casing. The electrical connector member 9 is desirably manufactured of a resilient metal, so that the struck-up contact strip 19 is spring-biased outwardly with respect to the flashlight casing. The contact strip 19 is insulated from electrical contact with the casing by the interposition at all points around the aperture of the fiber insulating strip 11.

Electrical contact between the rotatable ring 15 and

the struck-up contact strip 19 is accomplished by the movement of a conductive bearing 20 into seating engagement with a recessed portion 21 in the contact strip 19. Electrical contact between the rotatable ring 15 and the flashlight casing 1 is accomplished through contact of other conductive bearings 20 spaced around the ring with the exterior surface of the flashlight casing, and also through contact between the lateral flanges 26 of the rotatable ring and the underlying wall of the casing. The bearings are preferably spherical bearings seated within semi-spherical recesses 23 in the rotatable ring 15. In order to provide a positive "off" position for the rotatable ring 15, it is preferred that the conductive bearings 20 alternate with non-conductive bearings 24. Thus, when a non-conductive bearing 24 is in seating engagement with the struck-up contact strip 19, the electrical circuit will be open and the flashlight will be "off." A positive locking action against undesired or accidental rotation of the ring 15 is provided when either a conductive or a non-conductive bearing is seated within the struck-up contact strip 19.

In order to operate the flashlight switch, the rotatable ring 15 may be rotated in either a clockwise or counter-clockwise direction. Since the non-conductive bearings are alternatively arranged with the conductive bearings, rotation of the ring in either direction to the next adjacent bearing will provide a change in the switch position. As illustrated in Fig. 2, a preferred number of bearings for construction of the switch is 6 bearings, comprising three electrically conductive spheres, and 3 electrically non-conductive spheres. However, the switch could be constructed with a lesser or a greater number of bearings, as desired.

Longitudinal movement of the rotatable ring 15 relative to the flashlight casing 1 may be restrained by the abutment of the lateral flanges 26 of the rotatable ring against the bridging rivets 10, which may protrude above the surface of the flashlight casing. The stability of the rotatable ring may be increased by providing an additional pair of abutment rivets 27 on the opposite side of the casing to the bridging rivets 10. The abutment of the flanges 26 of the rotatable ring against these rivets further confines the ring in position and stabilizes its movement.

The flashlight construction described above is a preferred form of construction, and many modifications will occur to those skilled in the art which are within the scope of this invention. For example, the electrical connector strip 9, and the struck-up contact strip 19 illustrated in section in Fig. 1, could be duplicated at one or more points around the periphery of the flashlight. The addition of one or more duplicate connectors and contact strips within a single flashlight casing would decrease the resistance in the electrical circuit of the flashlight and would minimize the effects of wear and long usage on any individual contact strip. In a similar modification of the invention, the struck-up resilient contact strip 19 could be electrically connected to the base terminal of the rear dry cell in the flashlight casing, if desired, with the rotatable ring being insulated from the casing and electrically connected to the reflector bowl. This would merely reverse the arrangement already described but would operate quite efficiently.

While the arrangement of alternating the conductive bearings with non-conductive bearings is preferred for household flashlights, it is not necessary that the bearings be arranged in alternating sequence. In fact for some purposes, such as visual signaling or the transmission of light messages by Morse code irregular sequences of non-conductive and conductive bearings may be utilized to provide for "dots" and "dashes."

Throughout this specification and in some claims the bearings 20 and 24 have been described as spherical or "circular in cross-section." It should be understood that this latter expression defines and is intended to define cylindrical bearings or rollers which may be either tapered

or truly cylindrical in shape, such rollers being seated in recesses adapted to their individual shapes. It should also be understood that the expression "circular in cross section" defines and is intended to define bearings 20 and 24 which are less than complete spheres, for example, hemispheres or otherwise truncated spheres, which possess a rounded, slidable surface adapted to cooperate with the recess 21 in strip 19, the plane or truncated faces of such bearings being appropriately seated in the ring 15.

I claim:

1. An electrical switch mechanism comprising an electrically conductive tubular supporting member having an electrical contact strip insulated therefrom disposed thereon, a ring rotatably mounted around and in electrical contact with said tubular supporting member and having disposed therein a plurality of annularly disposed spherical bearings some of which are conductive and some non-conductive, each of said bearings being individually movable into engagement with said contact strip upon rotation of said ring, whereby positive control is provided over the electrical connection between said tubular supporting member and said contact strip.

2. An electrical switch mechanism for a flashlight comprising a metallic tubular casing having an electrical contact strip disposed therein, insulated therefrom, and exposed through an aperture therein, said electrical contact strip being spring-biased outwardly with respect to said casing, a ring rotatably mounted around and in electrical contact with said tubular casing, said ring having seated in spaced relation therein a plurality of circumferentially-disposed spherical bearings, the said bearings comprising conductive bearings alternating with non-conductive bearings, each of said bearings being movable into individual seating engagement with a contoured recess in said contact strip upon rotation of said ring, whereby positive control is provided over the electrical connection between said contact strip and said casing.

3. An electrical switch mechanism for a flashlight comprising a metallic tubular casing having an electrical contact strip disposed therein, insulated therefrom, and exposed through an aperture therein, said contact strip being spring-biased outwardly with respect to said casing, a cylindrical ring rotatably mounted around and in electrical contact with said tubular casing, said ring having seated in spaced relation therein a plurality of circumferentially-disposed bearings of circular cross-section, the said bearings comprising non-conductive bearings alternating with conductive bearings, each of said bearings being movable into individual seating engagement with a contoured recess in said contact strip upon rotation of said ring, whereby positive control over the electrical connection between said contact strip and said casing is obtained, and undesired rotation of said ring is deterred, by seating engagement between the seated bearing and the contoured recess in said contact strip.

4. A flashlight having a ring switch, comprising a metallic tubular casing enclosing a dry cell and making electrical contact with one terminal thereof, said casing supporting a light bulb, the filament of said light bulb being electrically connected at one terminal thereof to the opposite terminal of said dry cell and at the opposite terminal thereof to an electrical contact strip disposed within said casing and insulated therefrom, said contact strip being exposed through an aperture in said casing and spring-biased outwardly with respect to said casing through said aperture, a ring rotatably mounted around and in electrical contact with said tubular casing, said rotatable ring having seated in spaced relation therein a plurality of annularly disposed bearings which are circular in cross section and which comprise conductive and nonconductive bearings arranged in desired sequence and movable serially into electrical connection with said contact strip upon rotation of said ring, whereby an electrical connection may be made or broken between the opposite terminals of said cell and said filament may be energized or de-

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energized, the individual bearing in electrical connection with said contact strip seating within a contoured recess in said strip and thereby deterring undesired rotation of said ring.

5. A flashlight having a ring switch, comprising a metallic tubular casing enclosing a dry cell and making electrical contact with one terminal thereof, said casing supporting a light bulb, the filament of said bulb being electrically connected at one terminal thereof to the opposite terminal of said dry cell and at the opposite terminal thereof to an electrical contact strip disposed within said casing and insulated therefrom, said contact strip being exposed through an aperture in said casing and spring-biased outwardly with respect to said casing through said aperture, a cylindrical ring rotatably mounted around and in electrical contact with said tubular casing, said ring having seated in spaced relation therein a plurality of circumferentially-disposed balls, said balls comprising non-conductive balls and conductive balls arranged in desired sequence, said balls being movable into individual seating engagement with a contoured recess in said contact strip upon rotation of said ring, whereby positive control is obtained over the electrical connection between the opposite terminals of said cell.

6. An electrical switch mechanism comprising an electrically conductive tubular supporting member having an

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electrical contact strip insulated therefrom and disposed thereon, a ring rotatably mounted around and in electrical contact with said tubular supporting member and having disposed therein a plurality of annularly disposed bearings having circular cross-sections some of which bearings are conductive and some non-conductive, each of said bearings being individually movable into engagement with said contact strip upon rotation of said ring, whereby positive control is provided over the electrical connection between said tubular supporting member and said contact strip.

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