

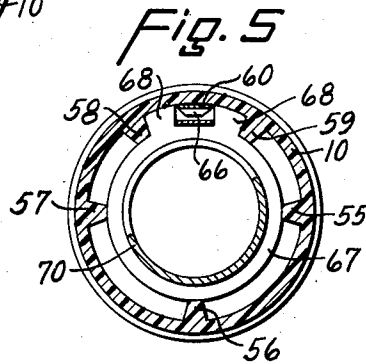
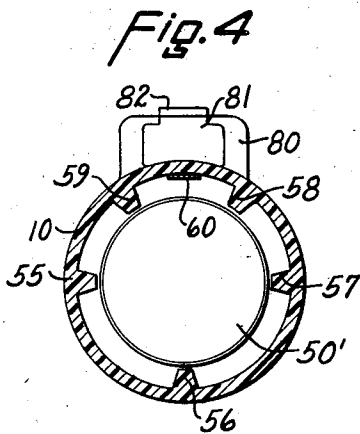
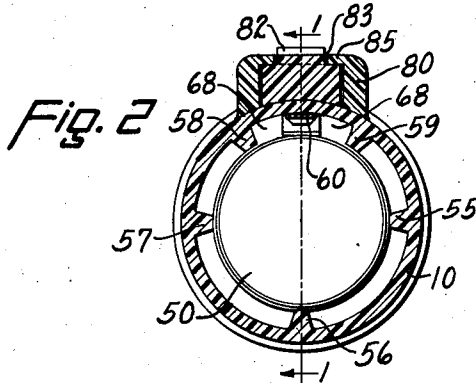
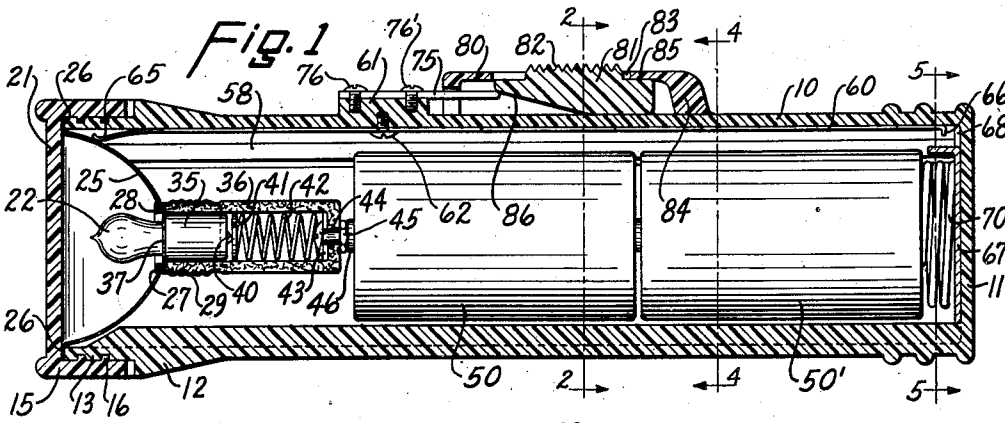
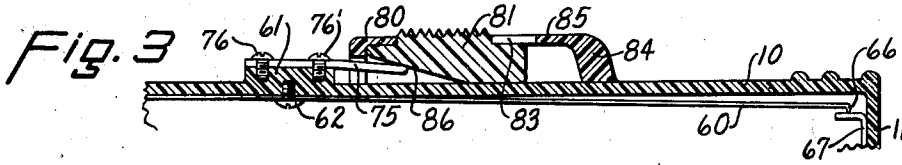
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WATERPROOF FLASHLIGHT

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WATERPROOF FLASHLIGHT

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1

This invention relates to portable lights, and more particularly to electric flashlights which are waterproof and buoyant.

One of the principal objects of the invention is to provide a light, such as a portable flashlight, in which the construction is such that the battery, the light bulb and the control switch are enclosed within a casing which is water-proof and in which the control switch may be opened or closed from the outside of the casing while maintaining the water-proof and sealed relation of the casing.

It is a principal object of the invention to provide a portable flashlight which is completely waterproof such that the device may be operated indefinitely in a damp or humid atmosphere, in rain, or even in a completely submerged condition, and may be controlled under those conditions with the same facility as if completely dry.

It is a further object to provide such a flashlight which is complete in itself including a battery within the casing, the flashlight being adequately protected against access of moisture and having characteristics of buoyancy such that it is adapted to float on a body of water without adversely affecting its operation or control.

Another object of the invention is to provide a light of such character in which the casing is made of very light and water-impermeable material, such as a molded plastic, formed as a unitary construction and completely closed and sealed against access of moisture, and the weight of the batteries and other parts carried by and enclosed within the casing are such that they will be adequately retained in operative relationship, and the displacement of the casing will be such that it will float.

Other objects and advantages of the invention will be apparent from the description and claims and the drawing.

In the drawing, in which like characters of reference designate like parts throughout the several views thereof, a portable or hand-type of flashlight is illustrated.

Fig. 1 is a longitudinal sectional view there-through along the line 1—1 of Fig. 2;

Fig. 2 is a cross-sectional view along the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view corresponding generally to Fig. 1 and showing the positioning of the parts for closing the switch;

Fig. 4 is a cross-sectional view along the line 4—4 of Fig. 1; and

Fig. 5 is a cross-sectional view on the line 5—5 of Fig. 1.

2

In the drawing, which illustrates a preferred embodiment of the invention, a portable or hand operated flashlight is shown which is of such character that it is completely water-proof and impervious to the entrance of moisture. It can be immersed in water for prolonged or indefinite periods without adverse effect, thus making it particularly adaptable for use in rainy weather or where it may be actually submerged in water. Also it is preferably so constructed and arranged as to provide a displacement exceeding its weight so that it will float, and being also impervious to water it may therefore be utilized and its light directed in any desired direction while it is floating in the water—as, for example, when doing boat repair work, or fording streams and the like.

As illustrated the main portion of the casing, which is designated by the numeral 10, is molded from a light tough plastic, which may be made thin yet sufficiently strong to withstand the rough usage to which such lights are put and the wall of which also may have some flexibility so that it may be deformed for effecting actuation of the switch mechanism, without the necessity of having any of the switch parts extend through the plastic. As shown the casing 10 has its rear end 11 molded integral and the only accessibility to the interior of the casing 10 is through the front end where an enlarged portion 12 is provided which is reduced at its extreme outer end to provide a molded thread designated generally by the numeral 13. Except for the single opening at the one end, the casing is unitary and free of other passages or apertures. A cover of molded plastic 15 is likewise provided with internal threads 16 which mesh with the threads 13. By using square threads, as shown, adequate frictional resistance is provided to hold the cover 15 against accidental unscrewing, but nevertheless it may be readily unscrewed by hand when desired. Also the square threads themselves, having extremely smooth surfaces of molded plastic, will likewise tend to form a seal sufficiently tight to prevent ingress of water.

The cover 15 can be made of transparent plastic and the central portion 21 thereof which is in the path of the projected rays from the light source may serve as a lens or transparent portion for the passage of light from the bulb 22 which is within the casing. Preferably the joint between the cover and the casing is sealed through the use of a suitable gasket such as one of synthetic rubber which is adequately resistant to fresh or salt water, to oil which may be floating on the water, etc. When the end cover 15 is threaded in place

3

tightly against the gasket a seal is provided which is completely impervious to the entry of water, and since this is the only opening or point of possible entry of moisture, a completely sealed and impervious interior is assured. A suitable material usable for forming the plastic parts of this device is cellulose acetate butyrate, a light and adequately flexible thermoplastic which is adequately strong or tough to withstand usage of the flashlight, which may be readily molded, and which may have any necessary parts affixed thereto by the use of acetone which is a volatile solvent for such material and which may be thus used to cause parts to bond together with sufficient firmness and strength.

As shown, the structure is made very light throughout and yet adequately rugged for severe usage. The light bulb 22 is surrounded by a reflector 25, the outer edge of which is overturned to form a flange 26 which is held between the extreme end of the casing 10 and the end cover portion 15, to be thus held tightly in place when the cover 15 is screwed into properly tight position upon the casing. The inner end of the reflector is provided with an essential opening to receive the light bulb 22, this inner end having a flange portion 27, which is enclosed between a beaded or overturned flange portion 28 of a thin metal threaded nipple 29, the thread 29 being satisfactorily rolled into the thin metal. The bulb 22 is supported from its base by a cylindrical metal portion 35, which can be free of threads or locking lugs, but which is of somewhat larger diameter than the base of the bulb itself as clearly shown in Fig. 1. This portion 35 fits freely within a cylindrical elongated cup 36, preferably also of molded plastic, and which has molded threads formed thereon to mesh with and be supported by the threads in the nipple 29. A collar 37 which may be made integral with the portion 35 of the bulb, or which may be a separate piece, such as a ring washer is located between the end of portion 35 and the base of the bulb, such collar being of greater diameter than the portion 35 and having a central opening therein of sufficient diameter to slide freely over the base of bulb 22. When the bulb is inserted in position with its portion 35 within the cup member 36 and the cup member is then threaded tightly into the nipple 29, collar 37 will be held between the end of the cup member 36 and the flange 28, to hold the light bulb assembly firmly in position. The central contact point 40 of the bulb rests against plate 41 which in turn rests against one end of the spring 42 within cup 36, the other end of the spring resting against a plate 43 which is held in position by a screw 44, the screw extending through the bottom of the cup portion 36 and having a nut 45 threadably mounted thereon.

As shown the battery may comprise one or more dry cells 50, 50', two of which are shown of the usual cylindrical construction. Electrical contact with one side of the lamp circuit is made with one pole of the battery by contact between the nut 45 and the usual central pole 46 of the battery.

The interior of the hollow casing 10 is of considerably greater diameter than the diameter of the battery, the battery thus occupying substantially less than the entire cross-sectional area of the casing interior. For this purpose the casing is provided with a plurality of circumferentially spaced ribs molded on the inside thereof and designated respectively 55, 56, 57, 58 and 59.

4

These ribs serve to hold the battery properly centered and at the same time to provide a very substantial air space which is of such volume that it gives an over-all displacement to the flashlight to cause it to float on water. The two ribs 58 and 59, as shown, are spaced adjacent each other and together define a passage within which is mounted a contact carrying member 60, which is fastened to an enlargement 61 which is molded as an integral part of the casing 10. As shown this contact carrying member is held in place by means of a screw 62 which is threaded into a threaded passage formed in the interior of enlargement 61, but which does not extend through to the outside of the casing, the contact carrying member 60 thus being held in position without the necessity of forming any opening or passage through the wall of the casing from the exterior.

Member 60 is a thin flexible strip of metal, as shown, the front end 65 being overturned and resting with spring pressure against the outside of the metal reflector 25, so as to be at all times in electrical conducting relation with one side of the lamp bulb through flange 28 and collar 37. The rear end of the contact member 60 is overturned as at 66, to form a movable switch contact point which is adapted to be brought into contact with the overturned end of the cooperating fixed contact member 67. Fixed contact 67 may be suitably held in place in the closed end 11 of the casing, for example by molding it into its proper position, and is preferably provided with wing portions 68 which extend radially outwardly into engaging relation with the ribs 58 and 59, as shown in Fig. 5, to prevent any rotation of the fixed contact, and to thus maintain the same in proper alignment with movable contact 66. Contact 67 is in electrical contact with the battery through spring 70, which rests against this member 67 and also against the end of the battery thus maintaining electrical contact with the opposite side of the battery. As shown in Fig. 1 the parts are so positioned that movable switch contact 66 is out of contact with the fixed member 67 and therefore the circuit is open.

Also affixed to the enlargement 61 on the outside of the casing is a metal spring 75, which is shown as fastened to the outside of the member 61 by two connecting screws 76 and 76', these screws also being threaded into threaded passages which extend only part way through the portion 61, so that no opening through the wall of the casing is formed.

A housing member 80 is molded to the outer surface of casing 10, or otherwise suitably affixed thereto. Such member will likewise be suitably of cellulose acetate butyrate and adequately affixed or bonded to the body portion by a suitable solvent such as acetone which being a volatile solvent for such material, as stated, may cause these parts to bond together with sufficient firmness. If the part 80 is molded integrally to the body portion 10, the rear end of said body portion is preferably molded to have an opening therethrough corresponding in cross-section to the passage which receives the control member 81, the control member which has its lower portion wider than the opening through which the roughened projecting portion 82 extends, so that the control member will be slidably held in place. And the button having been inserted into its proper location within the space inside the portion 80, the rear end of this passage behind the button, is closed by means of the plug 84, which

5

may be bonded in place by means of a volatile solvent such as acetone. This button, of course, in its cross-section will approximately correspond to the cross-section of the movable control member 81, thus closing the rear end of the passage in which the member 81 slides and also providing an overhanging portion 85, which serves as a stop to limit rearward movement of the control member 81. A sliding button or control member 81 is slidably received within the housing, the button having a serrated portion 82 extending through a slot 83 in the member 80 for manual access by the user. This control member 81 has one end formed to provide an inclined cam surface designated by the numeral 86, which extends over the free end of the member 75. When it is desired to close the switch contact 66 against contact 67 to thus close the circuit and light the bulb, member 81 is pushed forward, the cammed end riding up over the end of the member 75 and tending to force the end of that member 75 downward, as shown in Fig. 3. Since the casing 10 is made of plastic which is tough and has some degree of flexibility, as the member 81 is thus pushed forward the camming effect causes a bending or flexing of the casing, approximately about the point of location of the screw 62 which holds the contact strip in place. The distance from the screw 62 to the switch contact 66 is such that slight flexing of the wall of casing 10 will cause an enlarged or amplified movement of the contact strip 60 so that the contact 66, through multiplied movement, will contact with the fixed switch of the member 67, as shown in Fig. 3, thus closing the circuit and lighting the lamp. The button 81 thus has an on and an off position, in either of which it will be permanently retained through frictional contact with the housing, the control of the lighting of the bulb being thus available at all times and being substantially unaffected by moisture, water, or the like.

By means of the construction shown the interior of the flashlight may be maintained completely impervious to water, and by slight flexing of the casing 10 in the manner described the circuit through the battery and the light bulb will be controlled. Also by this construction the heavy metal parts ordinarily present in flashlights are dispensed with, and as the plastic from which the casing 10 is made is a non-conductor, the battery cells need have no extra supporting or enclosing framework but will function satisfactorily when held in place by the several ribs, and will be maintained in proper contact with each other and with the nut 45 by means of the spring 70 so that they will not rattle or separate to open the electrical circuit. In this manner a comparatively light construction is provided which is highly effective for all ordinary usages and which is also capable of being used underneath water or of floating on the surface so that it may be directed to cast its light to the desired place while leaving a person free to utilize both hands.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without

6

departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A self-contained water-proof flashlight comprising a unitary hollow casing having a single opening at one end thereof, said opening providing for receiving a battery within said hollow casing, a light bulb assembly received within said opening and supported in operative position within said hollow casing, switch means within said hollow casing and supported on the inner wall thereof for controlling the energization of said light bulb, said switch means being operable from an off to an on position in response to the flexing of the side wall of said casing, a manually movable slide member, means for mounting said slide member in position upon the outside of said casing, means attached to said wall and engageable by said slide for causing the flexing of said wall as said slide is moved to cause the opening and closing of said switch, and a cover member threadedly received over said opening in the casing in sealed relation thereto, said cover having a light transmitting portion in alignment with said light bulb assembly.

2. A self-contained water-proof flashlight of the character described comprising a sealed hollow casing having stiff and solid walls, at least one portion of said wall being flexible, switch means within said casing including a fixed contact mounted adjacent the end of said casing, a movable contact cooperating with said fixed contact to control the operation of said flashlight, an elongated arm for supporting said movable contact, means for securing said arm to the inner wall of said casing in relatively fixed relation thereto at a point relatively spaced with respect to said movable contact providing for amplified movement thereof in response to the flexing of said wall, a housing secured on the outer surface of said casing, a slidable member adjustably received within said housing and movable from an on to an off position, and a member secured to the wall of said casing and engageable with said slidable member providing for the flexing of the wall of said casing to effect control of said switch means.

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