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T. DE FOREST
FLASHLIGHT ASSEMBLY FOR UNDERWATER USE

3,042,796

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Fig. 1

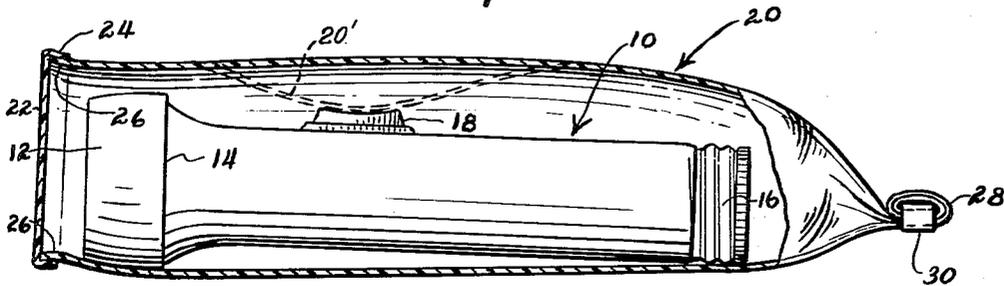


Fig. 2

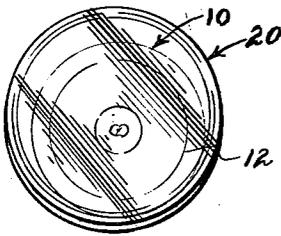


Fig. 3

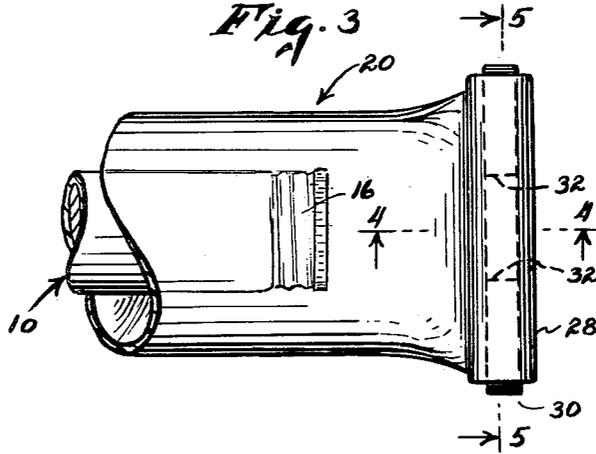


Fig. 4

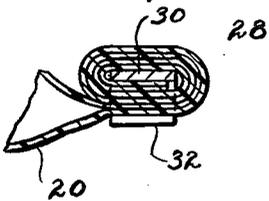
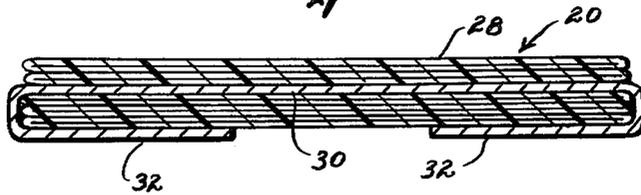


Fig. 5



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FLASHLIGHT ASSEMBLY FOR UNDERWATER USE

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2 Claims. (Cl. 240-6.4)

This invention relates to flashlight assemblies suitable for use under water or in places having atmospheres likely to cause deterioration of the flashlight.

It is an object of the invention to provide a flashlight assembly having a simple and inexpensive plastic case in which the flashlight is contained and with a pliant side wall of the case through which a conventional switch actuator of the flashlight can be manipulated from outside the case.

Another object of the invention is to provide a flashlight assembly having a case into which a conventional flashlight can be inserted, and from which the flashlight can be removed quickly and conveniently for removing the bulb or batteries, or for other servicing of the flashlight.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIGURE 1 is a side view, mostly in section, showing a waterproof flashlight assembly made in accordance with this invention;

FIGURE 2 is an end view of the flashlight assembly shown in FIGURE 1;

FIGURE 3 is a fragmentary top plan view of one end of the flashlight assembly shown in FIGURE 1; and

FIGURES 4 and 5 are sectional views taken on the lines 4-4 and 5-5, respectively, of FIGURE 3.

FIGURE 1 shows a flashlight 10 having an illumination portion 12 from which a light beam is projected when the flashlight is in operation. This illumination portion contains a lens and the bulb, and usually includes an end ring 14 which can be unscrewed from the rest of the flashlight to provide access to the bulb and for replacing the bulb when necessary.

The flashlight 10 also includes an end cap 16 which screws on to the end of the flashlight opposite the illumination portion, and this end cap can be removed when necessary to replace batteries.

On one side of the flashlight there is a switch actuator 18. This actuator is moved axially along the flashlight to open and close the switch within the flashlight for controlling the supply of current to the bulb. The construction thus far described is conventional, and it is a feature of the invention that it can be made with flashlights of conventional construction.

The flashlight 10 is enclosed in a plastic case 20 which is preferably of round, tubular shape and somewhat larger than the cross section of the largest portion of the flashlight; this largest portion being generally the illumination portion of the flashlight. The case 20 is also longer than the flashlight 10 and is made of pliant plastic material so that the side of the case can be depressed, as indicated by the dotted line position 20', to bear against the switch actuator 18. An operator of the invention can operate the switch 18, through the plastic case 20, by applying end-wise or axial pressure to the switch actuator 18 through the depressed portion 20' of the case.

Although the flashlight 10 does not occupy any fixed position in the case 20, the side wall of the case can be depressed at any area necessary, depending on the position of the flashlight in the case, to operate the switch actuator 18. In the preferred construction, the side wall

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of the case 20 is made of transparent plastic material so that the switch actuator 18 is always visible to an operator using the invention.

The case 20 has an end wall 22 which provides a transparent window in front of the illumination portion 12 of the flashlight. In the construction illustrated, this end wall 22 extends transversely of the longitudinal axes of the flashlight 10 and case 20, and closes the end of the tubular case 20 at one end.

The end wall 22 is shown with a circumferential rim 24 overlapping the end portions of the tubular part of the case 20; and the confronting faces of the rim 24 and the end portions of the tubular part of the case 20 are bonded together by cement 26, which is merely representative of means securing the end wall 22 to the tubular part of the case 20. It will be understood that the end wall 22 can be of one-piece construction with the tubular part of the case 20 when the case is made by a process which permits such shaping of the case.

The case 20 is closed at the end remote from the end wall 22 by flattening the tubular part of the case and rolling it into a spiral roll 28. With only a few turns of the case material in the spiral, the case is waterproof. Means are provided for holding the material of the spiral in a wound condition. The simplest expedient for this is a strip 30 of malleable material extending through the center of the spirally wound end of the case and folded over the outside of the spiral. In the preferred construction, this strip 30 is made of soft metal.

When the case 20 is to be opened, to remove the flashlight 10, the folded ends 32 of the strip 30 are bent out beyond the spiral so that the spiral can unroll. With a soft metal strip 30, these folded ends can be bent and straightened a great number of times without breaking.

Because of the large amount of clearance in the case 20 around the flashlight 10, there is considerable air trapped within the case. This makes the assembly buoyant so that it will float if dropped into the water. The air within the case 20 does not prevent convenient depressing of the side of the case into contact with the switch actuator 18, however, because a moderate amount of compression of the air can take place without the application of any substantial force, and when the air is compressed in the case 20 some air escapes through the spirally wound end of the case.

Experience has shown that even when the case 20 has a spirally wound end from which air can be easily expelled by squeezing the case, the assembly is still completely waterproof when fully immersed in water. This apparently results from the fact that the plastic material of the case is pliant and the water pressure outside of the case causes sufficient reduction in cross section to make the air pressure within the case equal to the water pressure outside of the case.

Because of the way in which the flashlight 10 is housed within the case 20, without being confined to any fixed position, it is possible to use flashlights of somewhat different cross section and length in the same case at different times. The overall size of the assembly can be reduced when desirable by squeezing the case hard enough to expel a substantial quantity of air from within the case. With the spiral end tightly wound, and with a case having a thin wall, the tendency for the case to spring back to its original shape is not sufficient to draw air back into the case, and the side wall will remain collapsed. This may be desirable when using the invention for skin diving, or for other uses where only a limited buoyancy is desirable, or where the invention must be stored within a confined space.

The case 20 can be made of thin plastic material which is limp and which has no tendency to hold a tubular shape. It is preferably made of plastic material which is

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stiff enough to be self-supporting, or nearly so, since this facilitates insertion and removal of the flashlight. In any event, the case 20 must be made of material that can be depressed easily into contact with the flashlight so as to operate the switch actuator through the side of the case. The term "pliant" is used herein to designate a plastic material of the required characteristics.

In the preferred construction, the entire case 20 is made of transparent material. It is necessary that the end wall or window 22 be transparent, but the remainder of the case can be made of translucent material when the pliability of the side wall is sufficient to enable the operator to locate the switch actuator quickly and conveniently by feel. This is not as convenient, however, as a construction in which a transparent material makes the flashlight visible at all times.

The malleable strip 30 for closing the end of the case 20 is preferred for clamping the end of the case closed after the tube has been flattened; but other means for holding the flattened end of the tube closed can be used, provided they are readily releasable to permit removal of the flashlight.

The preferred construction of the invention has been illustrated and described, but changes and modifications can be made and some features can be used in different combinations without departing from the invention as defined in the claims.

What is claimed is:

1. A waterproof flashlight assembly including an elongated and generally cylindrical flashlight housing adapted to completely enclose flashlight batteries and by which the batteries are held against transverse displacement, a switch actuator on the outside of the cylindrical housing, an illumination portion at one end of the housing and

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in line with the longitudinal axis of said generally cylindrical housing and from which a light beam is projected, a cap at the other end of the housing and which is removable for replacing batteries within the housing, an auxiliary plastic case of substantially greater length than width and completely enclosing the flashlight and of larger cross section than the flashlight, the case being elongated in the same direction as the flashlight housing and being of different construction at its opposite ends, one end having an unobstructed and transparent window in front of the illumination portion, and the other end of the case being expandable into an open condition for admitting the flashlight into the case, said other end being rolled up about an axis transverse of the elongated length of the case to close said other end after the flashlight has been inserted into the case, and releasable and adjustable fastening means at the rolled-up end of the case for preventing the rolled portion of the case from unrolling, the portion of the case over the switch actuator on the cylindrical housing being pliant and loose with respect to said actuator whereby the actuator can be operated through the plastic side of the case.

2. The waterproof flashlight assembly described in claim 1 and in which the entire case is made of transparent plastic material.

References Cited in the file of this patent

UNITED STATES PATENTS

805,452	Deegan et al. _____	Nov. 28, 1905
1,857,010	Avery _____	May 3, 1932
1,915,027	Jagenberg _____	June 20, 1933
2,651,763	Grimsley _____	Sept. 8, 1953
2,879,381	Coffey _____	Mar. 24, 1959