

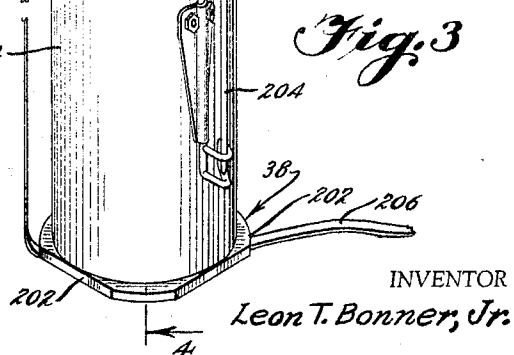
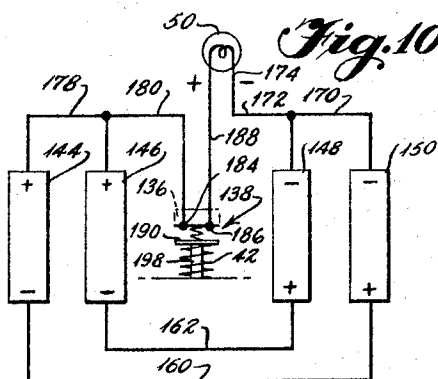
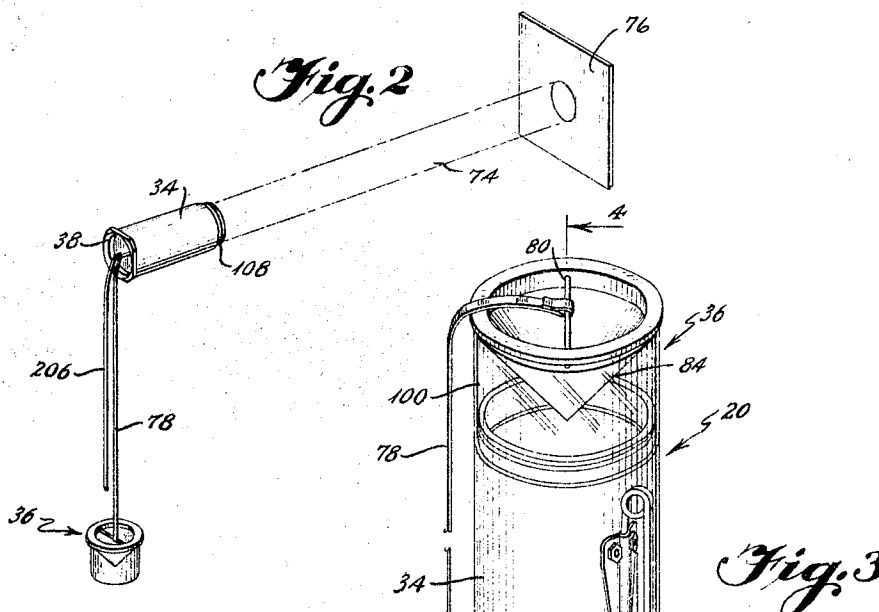
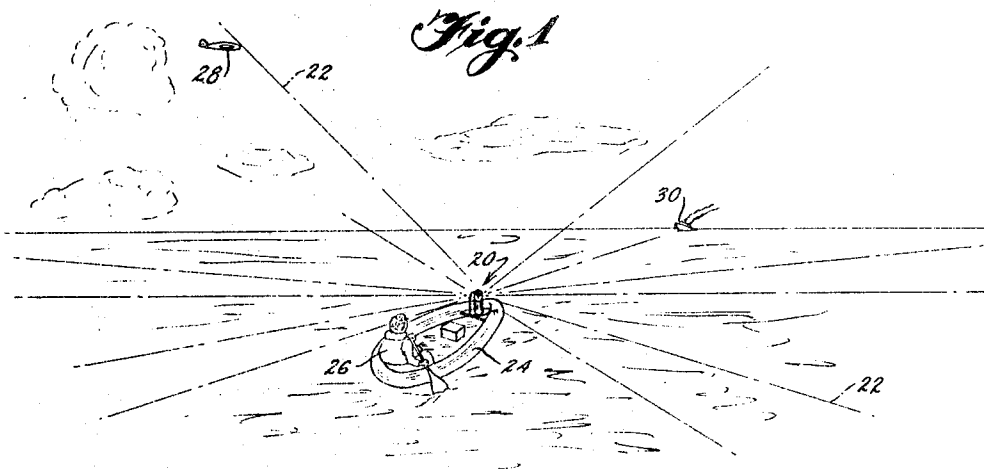
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L. T. BONNER, JR
LIGHT AND POWER SUPPLY

3,264,463

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2 Sheets-Sheet 1



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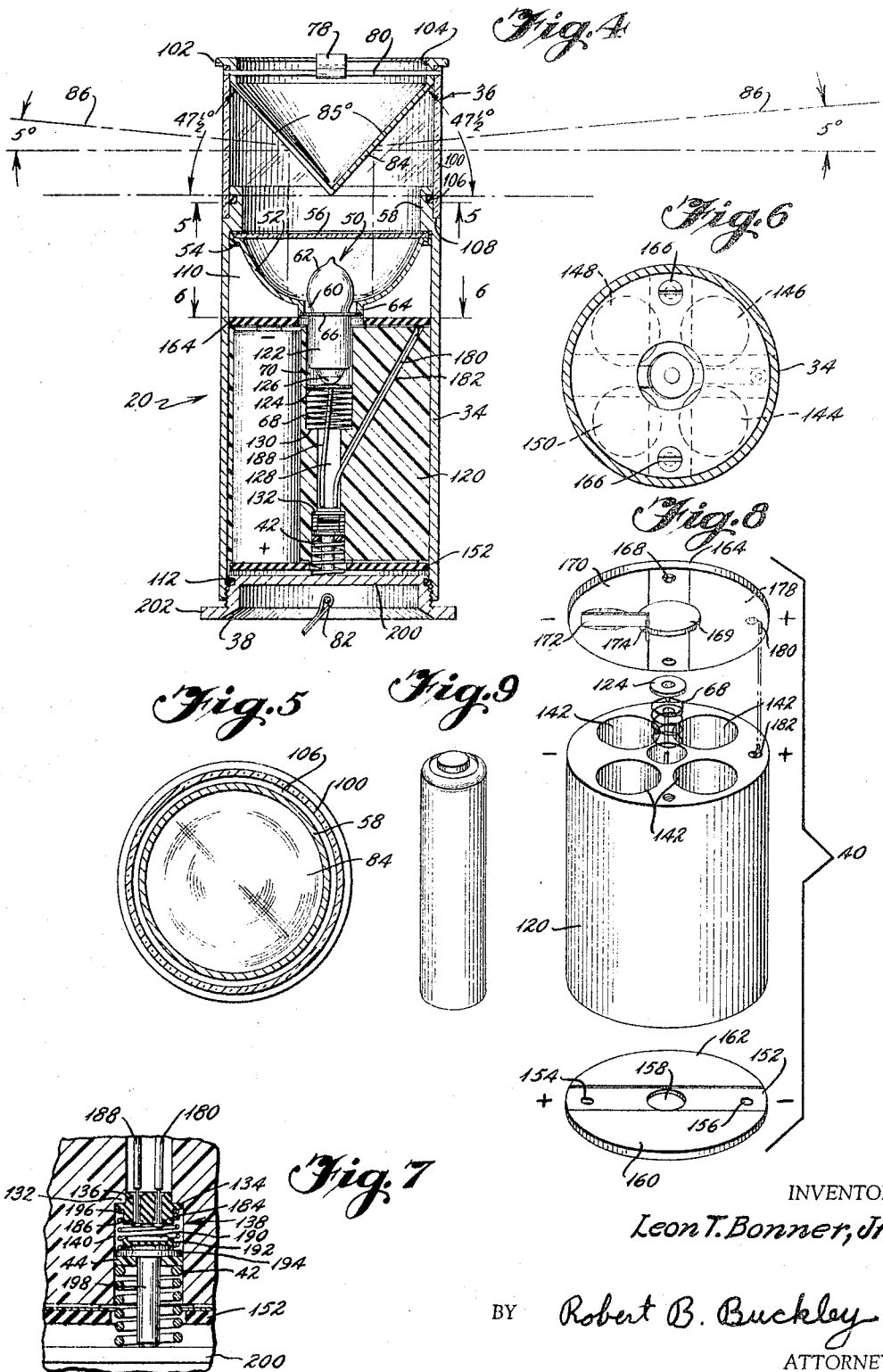
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LIGHT AND POWER SUPPLY

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9 Claims. (Cl. 240—10.66)

The present invention relates to illumination and devices for providing the same. More particularly, the present invention provides a survival and utility flashlight which is adapted to provide an intense beam of light to attract search and rescue units to a survivor at sea or on land. The device of the invention is convertible to provide a standard flashlight having a beam of great intensity.

Heretofore, various illuminating devices have been provided to attract search and rescue teams looking for survivors at sea. The search and rescue units must scan vast areas of the ocean in search of the survivors. Time is of the essence because the survivors may die of exposure in a relatively short time.

The present invention resides in the concept of an illuminating device which projects an intense zone or beam of light which zones of less intense light on opposite sides of the intense zone of light. By movement of the illuminating device, which will occur by hand or by the motion of the sea, the intense zone of light oscillates through the air. The search and rescue people will have this intense zone oscillate back and forth across their eyes to provide a flashing effect which tends to attract the attention of the search and rescue people.

The illuminating device of the invention is designed to produce light of maximum intensity from the lamp in the device by applying an unusually high voltage to the lamp.

The intense zone of light is produced by combining a parabolic reflector and a conical reflector. The parabolic reflector reflects light from a lamp into a parallel beam. The conical reflector is provided for reflecting the parallel beam of light into an intense zone radiating through 360 degrees of azimuth around the device.

The flashlight of the invention is constructed in a compact manner to provide for housing the various parts in a minimum of space. Water-tightness is achieved although the parts are removable for converting the light from a survival to a utility device and for replacing discharged batteries and repairs and maintenance.

For a better understanding of the invention and its other objects, advantages and details, reference is now made to the present preferred embodiment of the invention which is shown, for purposes of illustration only, in the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective of the illuminating device of the invention being used by a downed aviator in a raft for attracting the attention of search and rescue units;

FIGURE 2 is a perspective view of the device of FIGURE 1 with the top cover removed for use as a general utility flashlight;

FIGURE 3 is a perspective of the illuminating device with the top cover in place;

FIGURE 4 is a vertical section on the line 4—4 of FIGURE 3 and showing the conical beam elevation as five degrees;

FIGURE 5 is a horizontal section on the line 5—5 in FIGURE 4, looking up;

FIGURE 6 is a horizontal section on the line 6—6 of FIGURE 4, looking down;

FIGURE 7 is an enlarged fragmentary view showing the structure of the switch of the illuminating device;

FIGURE 8 is an exploded perspective view of the power pack included in the device;

FIGURE 9 is a perspective of one of the batteries employed in the device; and,

FIGURE 10 is a schematic design of the electrical circuit of the device.

Briefly stated, the illustrated embodiment of the invention includes a housing of hollow cylindrical form with the top cover removably secured by a watertight friction fit to the upper end of the housing. A parabolic reflector is mounted in the housing and reflects light from a lamp to form a parallel beam. A conical reflector is included in the top cover and reflects light to form a conical beam or zone of intense light radiating through 360 degrees of azimuth. Less intense light rays are radiated on both sides of the intense zone of light.

The inner angle of the conical reflector is 85 degrees. By locating the conical reflector coaxially with the parabolic reflector, the parallel beam of light from the parabolic reflector is reflected to form an intense conical beam of light radiating at an angle of 5 degrees to a plane perpendicular to the axes of the reflectors. When the light is held vertically, the intense conical beam of light is thus at an elevation of 5 degrees above the horizon. This particular elevation of the intense beam of light provides that the light will be aimed at search aircraft flying at 1500 to 2000 feet altitude, 3 miles away on any bearing. In this mode, the device does not require attendance in aiming at search craft, and the motion of the sea will provide a flashing effect for quicker acquisition.

A compact power pack is removably received in the housing and provides electrical power to the lamp. Four batteries are received in bores formed in a plastic body. Conductor leaves secured to the end plates of the body connect the batteries so that two series pairs of batteries are connected in parallel. A bottom cover is screw threaded to engage the lower end of the housing and is moved axially into and out of the housing by turning. The axial movement of the bottom cover causes it to operate an electric switch for closing the circuit through the lamp.

The top cover can be removed to form the device into a general utility flashlight wherein the parabolic reflector forms a cylindrical beam of light. In this mode, the device of the invention can be used for maximum light for signalling or illumination. The survivor can point the device toward the object desired, airplane or surface vessel.

A flexible lanyard connects the top cover to the bottom cover so that the top cover will not be lost when the top cover is removed. Further, another lanyard is provided to connect the device to the clothing of the wearer. A pin is secured to the housing and can be passed through the clothing of the wearer to provide additional security against loss of the light.

As seen in FIGURE 1, the illuminating device 20 is projecting light 22 from a survival raft light 24 containing an aviator 26 who has ditched his damaged aircraft and is awaiting rescue. Search and rescue units, such as an airplane 28 and a surface vessel 30, are in a position to be attracted by the light from illuminating device 20.

As seen in FIGURES 3 and 4, the illuminating device 20 includes a circular cylindrical housing 34 formed of aluminum, a removable top cover 36 and a removable bottom cover 38. The power pack 40, shown exploded in FIGURE 8, is received inside the hollow housing 34 and is held in position by a spring 42, seen in FIGURES 4, 7 and 10, having one end pressing against a disc 44 integral with the power pack and its opposite end pressing against the inner surface of bottom cover 38.

The power pack 40 contains electrical cells supplying power to a load such as an incandescent lamp 50 of the size or type PR2, having a design voltage of about 2.38 volts. The lamp has a filament located substantially at the focus of parabolic reflector 52 having the shape of an elliptic paraboloid. The parabolic reflector 52 is formed

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of aluminum and has a flange 54, seen in FIGURE 4, positioned beneath the edge of a transparent plane lens 56 having its edge beneath offset extension 58 at the upper end of housing 34. The parabolic reflector has an aperture 60 formed around its vertex for receiving the bulb 62 of the lamp 50. A reflector flange 64 extends downwardly around the periphery of aperture 60. The flange 66 of lamp 50 abuts against the lower end of the reflector flange 64. A spring 68 is received in an axial bore 70 formed in power pack 40 and urges the lamp 50 into its position in parabolic reflector 52.

When the top cover 36 is removed, as seen in FIGURE 2, the device is used as a general utility flashlight for radiating an intense cylindrical beam of light 74 from parabolic reflector 52 upon such surfaces as panel 76, seen in FIGURE 2. When the device is employed in the mode shown in FIGURE 2, loss of the top cover 36 is prevented by flexible lanyard 78 having one end connected to rod 80 of top cover 36 and its opposite end connected to rod 82 of bottom cover 38.

When the top cover is on the housing, as seen in FIGURES 3 and 4, the beam of light from parabolic reflector 52 is reflected from conical aluminum reflector 84 forming a part of top cover 36 and having its axis coaxial with parabolic reflector 52. The inner angle of the conical reflector 84, as measured across its axis, is 85 degrees. This is a critical angle for producing an optimum location of a survival beam of light.

When the parallel beam of light from parabolic reflector 52 is reflected from the conical reflector 84, an intense conical zone or beam of light 86, is radiated through 360 degrees of azimuth and in a direction inclined 5 degrees to a plane perpendicular to the axis of the conical reflector 84. Therefore, when the illuminating device 20 is located in a vertical position, as seen in FIGURE 1, the intense zone of light is radiated at an elevation of 5 degrees above the horizon.

This intense conical beam of light will be aimed at search aircraft flying at an altitude of 1500 to 2000 feet, 3 miles away on any bearing. As the waves of the sea cause the raft 24 to pitch and roll, the illuminating device 20 will oscillate and the intense beam of light 86 will oscillate in space. A person in search aircraft 28, FIGURE 1, will thus have the intense zone of light oscillate back and forth across his eyes, to produce a flashing effect, tending to attract his attention to the surviving aviator 26. Less intense rays of light are radiated on both sides of intense zone 86.

The light from conical reflector 84 passes through plastic transparent cylindrical wall 100 having its upper edge secured to the flange 102 and wall portion 104 of conical reflector 84.

The transparent wall 100 has a water-tight engagement with a resilient O-ring 106 seated in a groove in housing extension 58. The wall 100 has its lower edge abutting shoulder 108 of housing 34 to provide a smooth outer surface for the device 20 when the top cover 36 is on as in FIG. 3.

The parabolic reflector 52 is held in position by plastic foam mass 110 joined to the inner surface of housing 34. The water-tight integrity of the inside of the housing 34 is provided by a water-tight seal between plane lens 56 and housing extension 58 at the upper end; and by an O-ring 112 seated in a groove in bottom cover 38 and engaging the inner surface of housing 38 to form a water-tight seal.

The power-pack 40, shown in FIGURES 4 to 10, includes a plastic body 120 of external circular cylindrical shape, having an axial bore extending therethrough with portions of various diameters. The axial bore includes an upper portion 70 for receiving the lamp base 122, contact plate 124 engaging the tip contact 126 of lamp 50 and spring 68 for urging the lamp 50 into its position in parabolic reflector 52. The axial bore also includes a middle portion 128 of diminished diameter providing an

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upper shoulder 130 abutted by spring 68 and a lower shoulder 132 abutted by flange 134, FIGURE 7, of a base 136 of a switch 138. The lower, enlarged, portion 140 of the axial bore receives the switch 138.

Four cell bores 142 extend through the body 120 and receive cells such as shown in FIG. 9. As seen in FIGURES 8 and 10, two cells 144 and 146 have their positive poles at the upper end of the power pack and cells 148 and 150 have their negative poles at the upper end of the power pack.

Electrical conductors and leads are provided for connecting the cells in the arrangement shown in FIGURE 10, wherein cells 144 and 150 are connected to each other in series; cells 146 and 148 are connected to each other in series; and the two series pairs are connected in parallel. The switch 138 is provided for causing the circuit to supply the power of the batteries to the lamp 50.

At each end of the body 120 there is a plate for holding the cells in the bores. Lower plate 152 is formed of plastic and is an insulator. A central hole 158 is formed in plate 152 for receiving switch 138 and spring 42. The plate 152 is removably secured to body 120 by screws which pass through holes 154 and 156. Two copper conductor leaves are secured to the inner surface of plate 152. Leaf 160 electrically connects the negative pole of cell 144 to the positive pole of cell 150 to form a series pair. Similarly, conductor leaf 162 connects the negative pole of cell 146 to the positive pole of cell 148 to form another series pair.

Plastic, electrical insulator upper plate 164 is secured to body 120 by screws 166 passing through holes 168. A central hole 169 is formed in plate 164 for receiving lamp base 122. Copper conductor leaf 170 connects the negative pole of cell 148 with the negative pole of cell 150. Copper L-shaped conductor member 172 is joined to leaf 170 and has a depending arm 174, of arcuate shape, extending into bore portion 70 and engageable with the tubular base 122 of lamp 50 for supplying electrical power thereto.

Copper conductor leaf 178 connects the positive pole of cell 146 to the positive pole of cell 144. A lead 180, extends through diagonal hole 182 in body 120 and connects the conductor lead 178 to contact 184 of switch 138, FIGURE 7, in base 136 spaced from contact 186 joined by lead 188 to the contact plate 124 in electrical contact with bottom tip contact 126 of lamp 50.

As seen in FIGURE 7, the switch 138 is closed by a copper contact plate 190 movable to an upper position where it closes the circuit between contacts 184 and 186. The contact plate 190 is seated in disc 192 having an enlarged portion 194 against which spring 196 abuts, for urging the disc 192 downward to open circuit position. An actuator rod 198 is integral with the disc 192 and has its lower end engageable by the inner surface of bottom cover panel 200. The spring 196 thus urges the actuator rod 198 and its integral contact plate 190 to the lower position, shown in FIGURE 7, where the circuit is open. Screwing of the threaded bottom cover 38 into the threaded inner surface of housing 34, causes the actuator rod 198 to move into the bore portion 140 overcoming the resistance of spring 196, to the position shown in FIGURE 4, where the contact plate 190 engages contacts 184 and 186, and power is supplied to the lamp 50.

For turning the bottom cover 38, to turn the lamp on and off, and for disassembling the flashlight, the bottom cover 38 is provided with four corner extensions 202 for manual grasping by the operator.

A pin or clasp 204 shown in FIGURE 3, is secured to the outside of housing 34 for attaching the device to the clothing of the wearer. For further attachment, a flexible lanyard 206 has one end connected to rod 82 of bottom cover 38 and has its opposite end free, shown in FIGURES 2 and 3, for tying to the straps or buttonholes on the clothing of the wearer.

The electrical circuitry, including the characteristics of

the lamp 50 and the voltage and arrangement of the batteries 144, 146, 148 and 150, are selected to provide maximum intensity of light radiated from the lamp 50. An excess voltage or over-voltage, is applied to the PR-2 lamp 50 which produces an intense light from the lamp. Each of the cells 144, 146, 148, and 150 has a voltage of 1.34 volts direct current. The cells are mercury cells of the military type No. BA1328/U or the commercial type manufactured by P. R. Mallory Company under the code number RM-12R. The battery of four cells thus has a total no load voltage of 2.68 volts. The amperage through the lamp 50 is about 0.5 amp.

This over voltage, applied to lamp 50, causes the PR-2 lamp 50 to burn with great intensity; but yet the life of the lamp 50 is about equal to or longer than the life of the battery power supply.

Thus it will be seen that the invention provides an illuminating device that is convertible between two modes for various utilities, is water-tight, compact, and produces an efficient intense zone of light for attracting the attention of rescue units searching for survivors.

While presently preferred embodiments of the invention have been illustrated and described, it will be recognized that the invention can be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. For use in a flashlight, a power pack comprising a cylindrical body having an axial switch bore extending therethrough and four bores extending therethrough parallel to said axial switch bore; four cells in said bores; a pair of end plates secured to the ends of said body for holding said cells in said bores; conductor leaves secured to the inner surfaces of said end plates, each conductor leaf forming an electrical connection between cells that are not electrically connected by the leaves at the opposite end; an incandescent lamp in said axial bore; and a switch in said axial bore movable between positions opening and closing an electrical circuit including said lamp, said leaves and said cells.

2. A survival and utility flashlight comprising a hollow cylindrical housing; a parabolic reflector mounted in said housing; an incandescent lamp located substantially at the focus of said parabolic reflector; a top cover removably attached to the end of said housing adjacent said parabolic reflector, said housing having an extension of diminished diameter at the end thereof adjacent said parabolic reflector, an O-ring positioned in a groove in said extension, said top cover including a conical reflector and a transparent cylindrical wall surrounding said conical reflector, said wall forming a watertight fit with said extension and removably surrounding said extension, the inner angle of said conical reflector being 85 degrees as measured across the axis of said conical reflector, said parabolic reflector and said conical reflector being coaxial; a power pack removably located within said housing and including a cylindrical body having an axial bore and at least four surrounding bores extending therethrough, said bores being parallel, four cells in said bores; a pair of end plates secured to the ends of said body for holding said cells in said bores; conductor leaves secured to the inner surfaces of said end plates, each conductor leaf forming an electrical connection between a pair of cells, the leaves at each end forming an electrical connection between cells that are not electrically connected by the leaves at the opposite end; said incandescent lamp having its base positioned in said axial bore; a spring in said bore pressing said lamp toward said parabolic reflector; an electrically conductive member connecting one of the leaves on the end plate adjacent said lamp to the cylindrical base of said lamp; a bottom cover threadably connected to the end of said housing opposite said top cover, said threads being located so that turning of said bottom cover moves said cover axially into and out of said housing; a switch positioned in said axial bore and including a reciprocable actuator having one end extending outwardly from said

power pack for engagement by said bottom cover, a spring pressing said actuator toward said bottom cover, a base having a pair of spaced contacts, a lead connecting one contact to the tip contact of said lamp, a lead connecting the other contact to the other of the leaves on the end plate adjacent said lamp, a contact plate movable as one with said actuator and located so that, when said bottom cover moves said actuator into said axial bore, said contact plate completes the electrical circuit between said spaced contacts on said base; a spring having one end pressing against said body and its opposite end pressing against said bottom cover; a flexible member having one end joined to said top cover and its other end joined to said bottom cover; a lanyard having one end joined to said bottom cover and its other end free; said bottom cover having sidewise extensions for manual grasping.

3. A manually-portable flashlight comprising a parabolic reflector, said reflector having an aperture formed at its vertex; a lamp having its base received in said aperture; said lamp having its filament located substantially at the focus of said parabolic reflector; means for supplying electrical power to said lamp; a conical reflector having its small end located closest to said parabolic reflector, the bases of said conical and parabolic reflectors being substantially equal so that the maximum cross-section of said reflectors, measured perpendicularly to their axes, are about equal; said reflectors being mounted substantially coaxially, the inner angle of said conical reflector being about 85 degrees as measured across the axis of said conical reflector, whereby some of the light from said lamp is reflected from said parabolic reflector to form parallel rays in a cylindrical beam which is in turn reflected from said conical reflector to form a narrow intense conical zone of light inclined about 5 degrees from the plane perpendicular to the axes of said reflectors and less intense light rays are radiated on both sides of said narrow intense zone of light; whereby, when said flashlight is held vertically, said intense zone of light will radiate at an elevation of 5 degrees above the horizon.

4. A portable water-tight survival and utility flashlight for marine use, said flashlight comprising a hollow housing; a parabolic reflector mounted at one end of said housing; means forming a water-tight seal across the end of said housing at which said parabolic reflector is located, a lamp positioned substantially at the focus of said parabolic reflector; a power pack removably received in the hollow interior of said housing and including cells and connections for supplying electrical power to said lamp; a switch at the end of said power pack opposite from said lamp, said switch being yieldably urged toward the open circuit position wherein said switch is extended outwardly from said power pack; a bottom cover removably closing the end of said housing adjacent said switch, water-tight seal means between said bottom cover and the inner surface of said housing; said bottom cover being threadably received in said housing and rotatable to advance inwardly of said housing to contact said switch and move said switch to closed circuit position to light said lamp; a top cover removably positioned on said housing, said top cover including a transparent wall substantially parallel with said housing and a conical reflector having its small end located closest to said parabolic reflector, said parabolic and conical reflectors being substantially coaxial whereby some of the light from said lamp will be reflected from said parabolic reflector to form parallel rays in a cylindrical beam which is reflected in turn from said conical reflector to form a zone of intense light extending laterally from said conical reflector and passing through said transparent wall to provide illumination.

5. The invention as set forth in claim 4 and including a lanyard connecting the top cover to the remainder of said flashlight whereby, when said top cover is removed to provide illumination by supplying a parallel beam of light from said parabolic reflector, the loss of said top cover will be prevented.

6. The invention as set forth in claim 4 wherein said bottom cover has a plurality of extensions projecting laterally beyond said housing for manual grasping by an operator to rotate said bottom cover for actuation of said switch and disassembly of said flashlight for removal of said power pack.

7. A portable water-tight survival and utility flashlight for marine use, said flashlight comprising a right-circular-cylindrical housing, a parabolic reflector mounted at one end of said housing; a lamp located substantially at the focus of said parabolic reflector; a plane lens extending across said parabolic reflector, an offset extension at the upper end of said housing extending inwardly over said plane lens and forming a water-tight seal therewith, a top cover having a right-circular-cylindrical transparent wall removably received on said offset extension, said wall and housing having the same external diameter; means forming a water-tight seal between said offset extension and said transparent wall, said top cover including a conical reflector having its small end closest to said parabolic reflector, said parabolic and conical reflectors being substantially coaxial whereby some of the light from said lamp will be reflected from said parabolic reflector to form parallel rays in a cylindrical beam which is reflected in turn from said conical reflector to form a zone of intense light extending laterally from said conical reflector through said transparent wall; an electrical power pack removably received within said housing; means electrically connecting said power pack to said lamp, said power pack including a switch at the end thereof opposite said lamp; a bottom cover threadedly received in the end of said housing opposite said lamp for removably retaining said power pack in position, said bottom cover being rotatable to advance to engage and actuate said switch, and, means forming a water-tight seal between said bottom cover and said housing.

8. A flashlight as set forth in claim 7 wherein said top

cover has a rod extending thereacross, said bottom cover has a rod extending thereacross; and including a flexible lanyard extending from the rod of said top cover to the rod of said bottom cover whereby, when said top cover is removed to employ the parallel beam from said parabolic reflector as a concentrated beam of light, the loss of said top cover will be prevented.

9. The invention as set forth in claim 8 and including an additional flexible lanyard having one end connected to the rod of said bottom cover and its opposite end free for tying to the clothing of the wearer.

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