

[54] POWER SUPPLY AND PRESSURE SWITCH ASSEMBLY

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[57] ABSTRACT

A combination power supply and pressure switch assembly for use with lifeboats or other flotation devices for automatically energizing a circuit when the flotation device is deployed into the water. The assembly includes a corrosion proof, water-tight main housing for batteries, or the like, and a pressure responsive switch housing removably fastened to the bottom of the main housing for convenient maintenance or replacement of the batteries or switch in the event such is required.

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[51] Int. Cl. B63c 9/20

[58] Field of Search 9/311, 313, 314; 200/83 N, 200/83 V; 340/236; 116/124 B

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3 Claims, 7 Drawing Figures

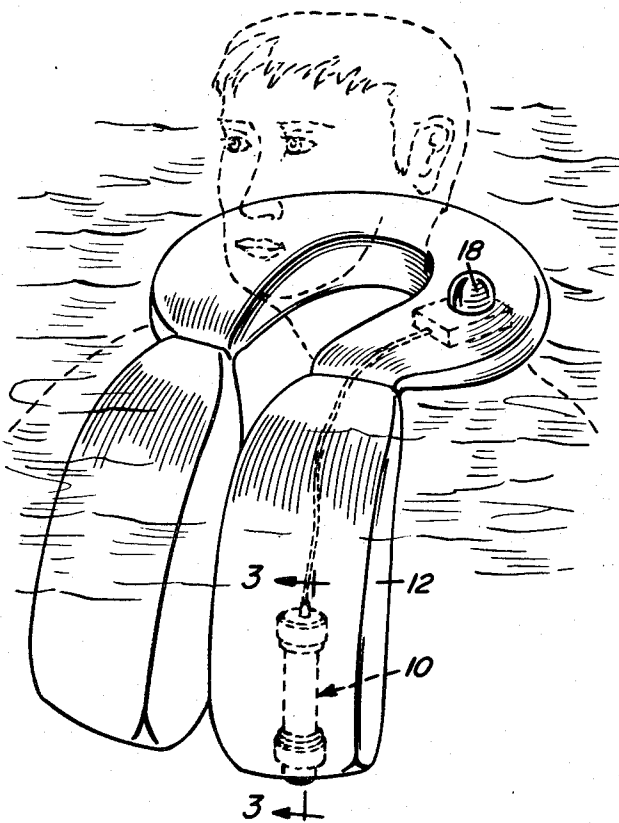


Fig. 1

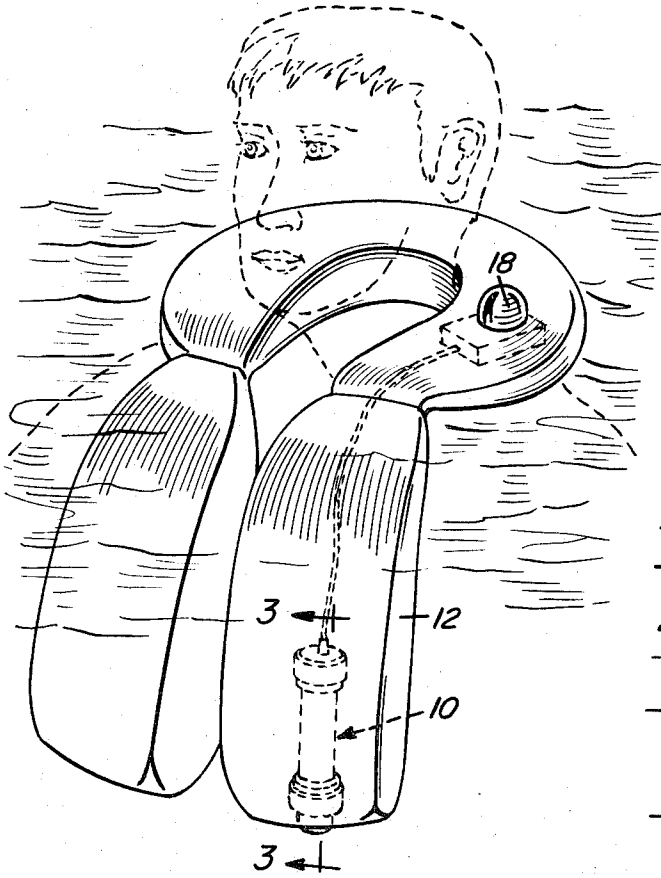


Fig. 3

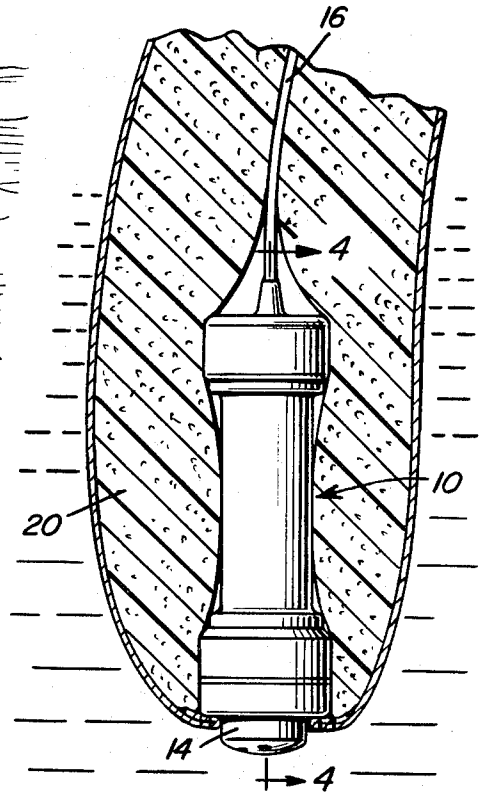


Fig. 2

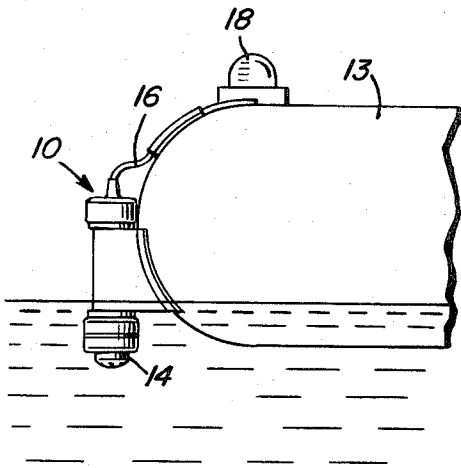


Fig. 7

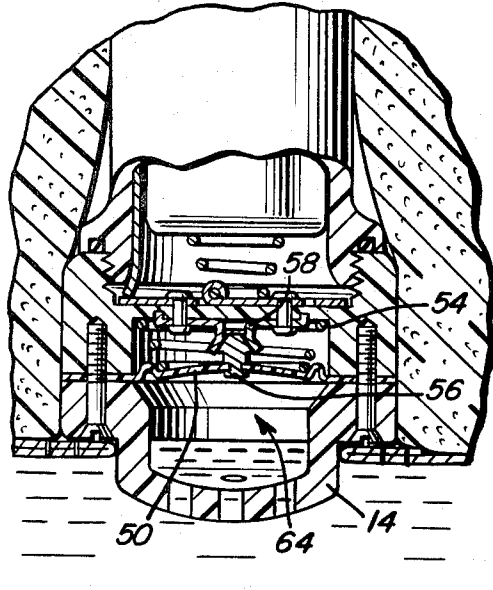


Fig. 4

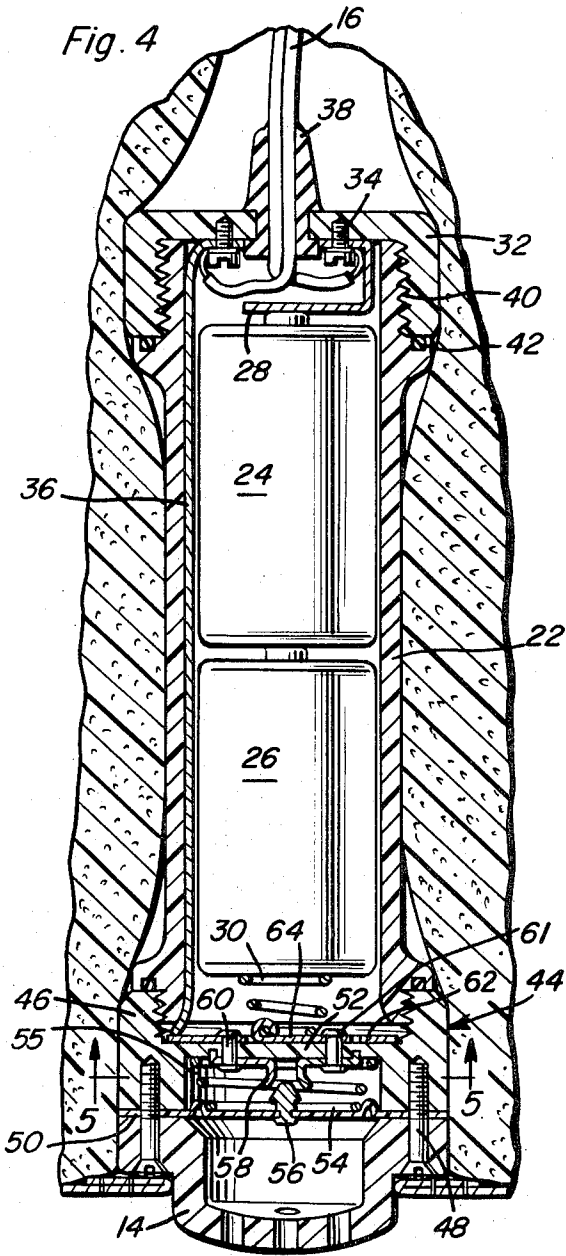


Fig. 6

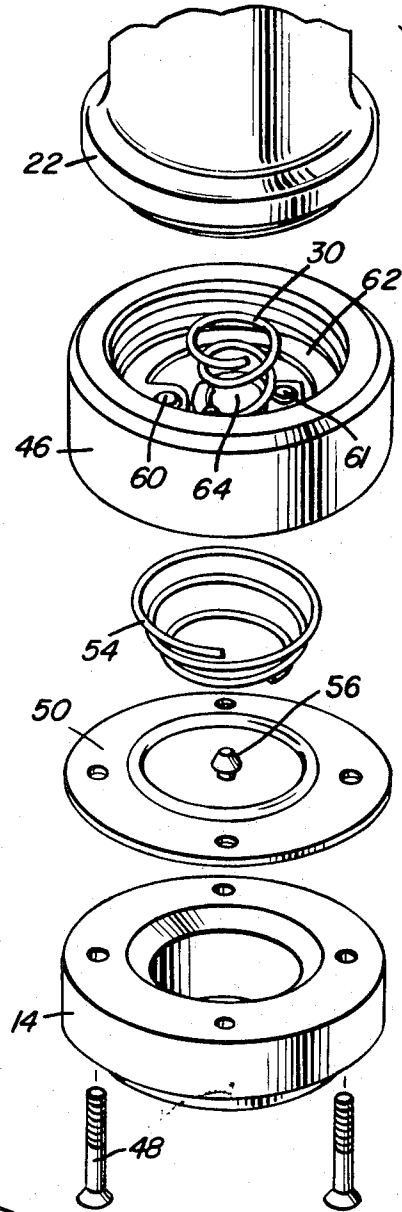
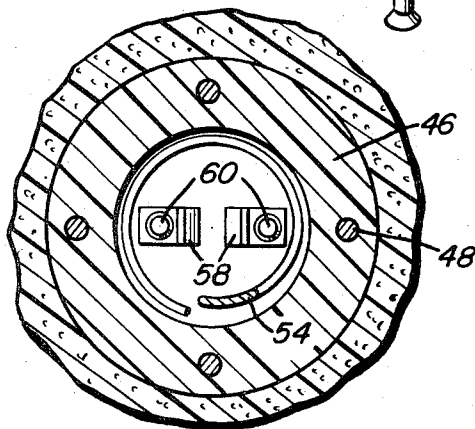


Fig. 5



POWER SUPPLY AND PRESSURE SWITCH ASSEMBLY

The present invention is generally related to pressure responsive switches and, more particularly, to a combination power supply and switch assembly for use with flotation devices.

In the past, pressure responsive switches have been provided for various applications. For the most part, such conventional pressure switches did not include means for carrying batteries or other source of electrical energy and, as such, often were not suitable for applications requiring portable power supplies, as is the case with emergency marine equipment and the like. Furthermore, most conventional pressure switch structures were extremely delicate mechanisms, not capable of withstanding the severe conditions, such as those encountered in emergency marine situations entailing the deployment of flotation equipment.

Therefore, it is an object of the present invention to provide a novel power supply and pressure responsive switch assembly which is compact, heavy duty, suitable for securement to flotation equipment, and capable of withstanding severe conditions, such as encountered in emergency marine situations.

Another object of the present invention is to provide a versatile combination power supply and switch assembly including a housing of generally cylindrical configuration formed from nylon, or other strong corrosion-proof material, and provided with a protective perforated cover at its lower end which partially surrounds a pressure responsive diaphragm associated with a switch mechanism.

It is a further object of the present invention to provide a unique combination power supply and pressure switch assembly which is of water-tight construction and which may be readily disassembled for maintenance or replacement of the associated batteries or pressure switch mechanism.

Still another object of the present invention is to provide a unique power supply and pressure switch assembly which is comprised of a small number of parts, is compact, durable, long lasting, and economical to manufacture.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

FIG. 1 is a perspective view of a typical life preserver with the assembly of the present invention mounted thereon and shown in dash line.

FIG. 2 is a partial elevational view of a typical life raft with the assembly of the present invention appropriately mounted thereto.

FIG. 3 is a sectional view taken substantially along section 3—3 of FIG. 1.

FIG. 4 is an enlarged sectional view taken along section 4—4 of FIG. 3 with the switch in an opened position.

FIG. 5 is a sectional view taken along section 5—5 of FIG. 4.

FIG. 6 is an exploded perspective view of the lower portion of the assembly including the pressure responsive switch mechanism.

FIG. 7 is a partial sectional view similar to FIG. 4, but with the switch mechanism in a closed position.

Referring now, more particularly, to FIGS. 1 and 2 of the drawings, the combination power supply and switch assembly of the present invention is generally indicated by the numeral 10 and is illustrated in FIG. 1 as being secured to a typical life preserver 12, and in FIG. 2 as being secured to a typical life raft 13, such as commonly used in emergency marine situations. The switch is of elongated, generally cylindrical configuration and is secured in place such that it will be at least partially submerged when the flotation device is deployed. The bottom of the switch assembly is provided with a perforated cover member 14 which permits the entrance of water, or water pressure, to actuate the switch mechanism, as hereinafter explained. A pair of conductors 16 extend from the top of the assembly for connection to an appropriate signalling device, such as the light indicated at 18.

Due to its compact configuration, the assembly of the present invention may be secured in position by mounting such substantially within the confines of the life preserver or other flotation device. Referring to FIG. 3 it will be observed that the assembly may be mounted to a life preserver with flotation material 20 surrounding the assembly and holding it snugly in place, such that it will not be adversely disturbed even under severe marine conditions. It will also be appreciated, that when mounting the assembly in this manner, only the bottom cover member 14 is left exposed, the major portion of the assembly being protected against possible damage.

Referring now, more particularly, to FIGS. 4-6, the internal structure of the assembly of the present invention may be seen in more detail. A main housing 22 is provided which is of elongated, tubular construction and, preferably, of generally cylindrical configuration. Preferably, main housing 22 is formed from well known insulation materials, such as nylon or other synthetics, which are non-corrosive in nature even under most severe marine conditions. The main housing is of appropriate length and diameter to define a compartment to accommodate a pair of batteries 24 and 26, or other suitable electrical power source. Battery 24 is maintained in contact with a stationary terminal 28 under the influence of a coil compression spring 30 which presses upwardly against the bottom of battery 26. Terminal 28 is supported by a top cover member 32 by way of a screw 34 or similar fastener. An elongated conductive strip 36 extends along the interior length of main housing 22 and is fastened to top cover 32 in a manner similar to stationary terminal 28. One of the conductors 16 is appropriately connected to stationary terminal 28, with the other being connected to conductive strip 36 inside the battery compartment. The conductors extend through an opening formed in top cover 32 and the opening is provided with a grommet 38, or other appropriate sealing means, which prevents the entrance of water or contaminants into the battery compartment. It will be appreciated that the top cover is removably fastened to main housing 22 by way of threads 40 or other readily removable fastening means. In addition, an O-ring 42 is provided between top cover 32 and main housing 22 to assure a proper seal when the top cover is screwed in place.

The lower end of the assembly is provided with a switch housing generally indicated by the numeral 44

and in threaded engagement with the main housing in a manner similar to top cover 32. The switch housing is comprised of perforated bottom cover 14 and a body member 46 which are fastened together by way of non-corrosive screws 48, or similar means. The switch mechanism is provided within housing 44 and includes a flexible diaphragm 50 with a peripheral portion which is sandwiched between main body 46 and perforated cover 14, with the medial portion of the diaphragm being free to flex under the influence of water pressure, or the like. Preferably, body member 46 is of molded, one-piece construction with a transverse wall 52 which underlies the battery compartment to provide a water-tight seal at the bottom end thereof. Transverse wall 52 is spaced from diaphragm 50 to define an air-tight chamber 55. A coil spring 54, of relatively mild compression, is disposed in chamber 55 between transverse wall 52 and the top surface of diaphragm 50 to influence the diaphragm in a downward direction, as illustrated in FIG. 4.

A movable bridging contact 56 of conductive material is mounted at or near the center of diaphragm 50 in a manner which assures a water-tight seal which prevents the entrance of water into chamber 55. A pair of stationary contacts 58 are supported on the bottom side of transverse wall 52 by way of a pair of conductive posts or rivets 60 and 61. The stationary contacts are spaced from each other but are disposed in the path of travel of movable bridging contact 56. Conductive post 60 is attached to an annular conductive ring 62, preferably of spring metal, while conductive post 61 is connected to a central terminal 64 which supports coil compression spring 30. The lower end of conductive strip 36 makes electrical contact with annular conductive ring 62 when the top cover and switch housing are screwed firmly in place.

Referring to FIG. 7, the switch mechanism associated with the present invention is illustrated in the closed position, with diaphragm 50 flexed upwardly to bring movable contact 56 into bridging engagement with stationary contacts 58. It will be appreciated that when the flotation device carrying the assembly of the present invention is deployed, the lower end of the assembly is submerged, whereby the diaphragm is subjected to water pressure sufficient to flex it upwardly to effect bridging of stationary contacts 58. Preferably, spring 54 exerts only mild forces acting in a downward direction against diaphragm 50, such that a few inches of water pressure is sufficient to effect switch closure. It will be appreciated that since the perforations of bottom cover 14 are significantly below diaphragm 50, the diaphragm is isolated from the water by a trapped air pocket. This arrangement prevents prolonged exposure of the diaphragm to salt water or the like during use. While the water may make periodic contact with the diaphragm due to splashing encountered under severe weather conditions, the air pocket minimizes the amount of contact between the diaphragm and water. It will also be appreciated that the chamber 55, and the contacts therein, are sealed against the entrance of water or contaminants by both the diaphragm and the above-mentioned air pocket. Preferably, conductive posts 60 and 61 are molded into the transverse wall of body member 46 to assure a substantial seal between the battery compartment and the stationary contact chamber. In effect, this arrangement provides a triple seal for the battery compartment, as the compartment

is separated from the water by (1) the trapped air bubble, (2) diaphragm 50, and (3) transverse wall 52. This assures reliable operation of the assembly under the severest of weather conditions.

The combination power supply and pressure switch assembly of the present invention may be readily disassembled for maintenance, repair, or replacement of the associated batteries. Also, in event of a damaged or defective pressure switch mechanism, switch housing 44 may be easily unscrewed from the main housing and a new pressure switch screwed in place. The same is also true of the battery compartment or main housing. This provides a substantial cost savings, as it is not necessary to replace the entire assembly in the event that the pressure switch or power source need be replaced.

From the foregoing description, it will be appreciated that the combination power supply and pressure switch assembly of the present invention provides a versatile, compact, heavy duty and highly reliable assembly which is readily adaptable to use under the severest of marine conditions. Operation of the pressure switch may be achieved with a minimum amount of water pressure and is effective to automatically energize a lamp or other signal device. Due to the relative simplicity of the assembly of the present invention, it is economical to manufacture and maintenance costs will be minimal.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. For use with a flotation device, an assembly comprising an elongated, tubular main housing defining an electrical power supply compartment, an electrical power supply disposed in said main housing, a top cover attached to one end of said housing, a switch housing removably fastened to the opposite end of said main housing and in sealing engagement therewith, and pressure responsive switch means mounted in said switch housing to automatically effect closure of a circuit associated with said power supply upon deployment of the flotation device into the water, said switch housing including a perforated bottom cover for providing fluid communication between the surrounding water and said pressure responsive switch means, said switch housing including a transverse wall underlying a battery compartment, said switch means including a combined flexible diaphragm and seal underlying and spaced from said transverse wall and together with said switch housing defining a sealed chamber, one side of said diaphragm facing toward said bottom cover and the opposite side of said diaphragm facing said sealed chamber, said switch means including a pair of spaced stationary contacts supported by said transverse wall and disposed in said chamber, a movable bridging contact mounted to said diaphragm for movement therewith into engagement with said stationary contacts under the influence of predetermined pressure conditions, each of said stationary contacts being connected to a conductive post which extends longitudinally through said transverse wall into said compartment, said conductive posts being in sealing engage-

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ment with said transverse wall to assure a seal between said chamber and said compartment, wherein said power supply is protected against the elements even if said chamber seal is broken, said switch housing being threadedly fastened to said main housing for easy removal in the event maintenance or replacement is required, and said switch housing including a molded body member integral with said transverse wall and disposed between said main housing and said bottom cover.

2. The combination set forth in claim 1 including a marine flotation device, said assembly being supported from said device such that said main tubular housing is in a generally vertical orientation when said flotation device is deployed with said switch housing and bottom cover disposed at the lower end of said main housing and below the surface of the water to effect operation of said switch means.

3. For use with a flotation device, an elongated main tubular housing having a first end closed against the entrance of fluid therein and a second open end, a tubular switch housing having a transverse wall therein intermediate its opposite ends sealing the opposite ends of the interior of said switch housing from each other, one end of said tubular switch housing being secured over

said second end of said main housing closing said second end against the entrance of fluid thereinto, pressure responsive switch means mounted in the other end of said tubular switch housing and including a flexible and fluid-impervious combined diaphragm and seal secured over the other end of said switch housing in fluid-tight sealed engagement therewith, a perforated bottom cover secured over said other end of said switch housing and said combined diaphragm and seal, said switch means including stationary contacts supported by said transverse wall on the side thereof adjacent said diaphragm and a bridging contact supported from said diaphragm and engageable with said contacts for bridging the same upon movement of the portion of said diaphragm from which said bridging contact is supported toward said transverse wall due to an increase of ambient pressure on the side of said diaphragm remote from said transverse wall, an electrical power supply disposed within said main housing, and conductor means electrically connecting said contact supported from said transverse wall and said electrical power supply, said electrical conductor means including portions of an electrical circuit.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,798,692

Dated March 26, 1974

Inventor(s) Harvey L. Madeley

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Page 1, in the heading delete "Eugene H." in name of assignee

H. Eugene Madeley and substitute -- H. Eugene --.

Signed and sealed this 1st day of October 1974.

(SEAL)

Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

UNITED STATES PATENT OFFICE
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