

[72] Inventor **Paul E. Ohlstein**
Smithtown, N.Y.
 [21] Appl. No. **838,164**
 [22] Filed **July 1, 1969**
 [45] Patented **May 25, 1971**
 [73] Assignee **The United States of America as represented
 by the Secretary of the Navy**

3,426,942 2/1969 McMains et al. 222/5

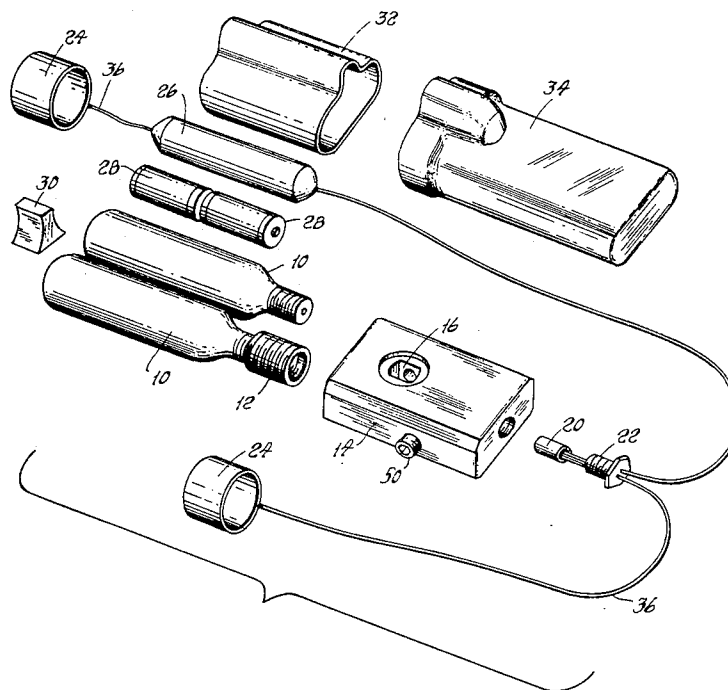
Primary Examiner—Samuel F. Coleman
Assistant Examiner—James M. Slattery
Attorneys—Louis A. Miller, Louis B. Applebaum and Philip
 Schneider

[54] **SQUIB-POWERED AUTOMATIC INFLATION
 DEVICE**
1 Claim, 4 Drawing Figs.

[52] U.S. Cl. 222/5
 [51] Int. Cl. B67b 7/24
 [50] Field of Search. 222/5

[56] **References Cited**
UNITED STATES PATENTS
 3,059,814 10/1962 Poncel et al. 222/5

ABSTRACT: An explosive squib device for automatically inflating a life vest when the device is immersed in sea water. The explosive squib, when fired, actuates piercing pins which allow pressurized CO₂ to escape from a pair of gas cartridges into the life vest. The gas cartridges are formed from electrically conductive material, electrically insulated from each other, separated from each other physically, and made part of the electric circuit which fires the explosive squib. The cartridges thus form a pair of electrodes separated by an air gap, the circuit being closed when the cartridges are immersed in sea water.



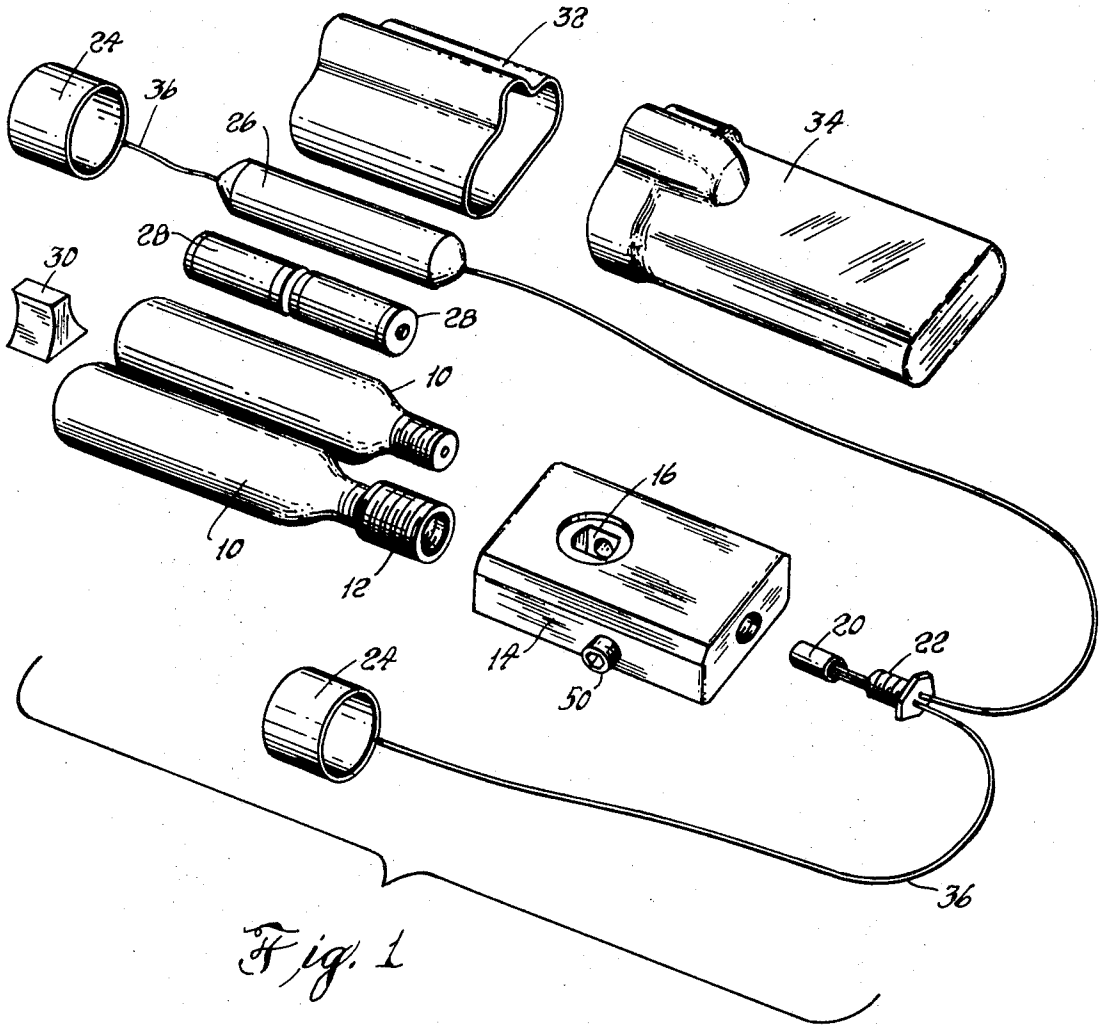


Fig. 1

INVENTOR.
 PAUL E. OHLSTEIN
 BY *Philip Schneider*
Law D. Apple
 ATTORNEYS

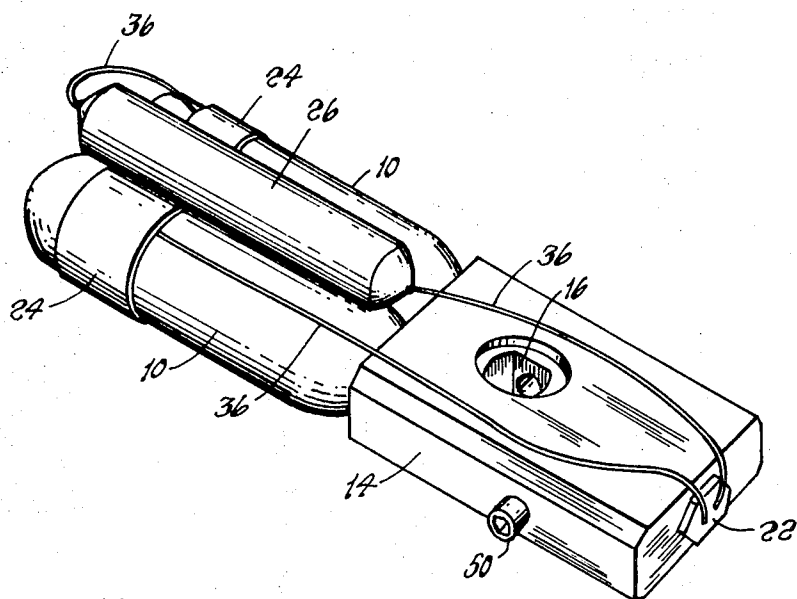


Fig. 2

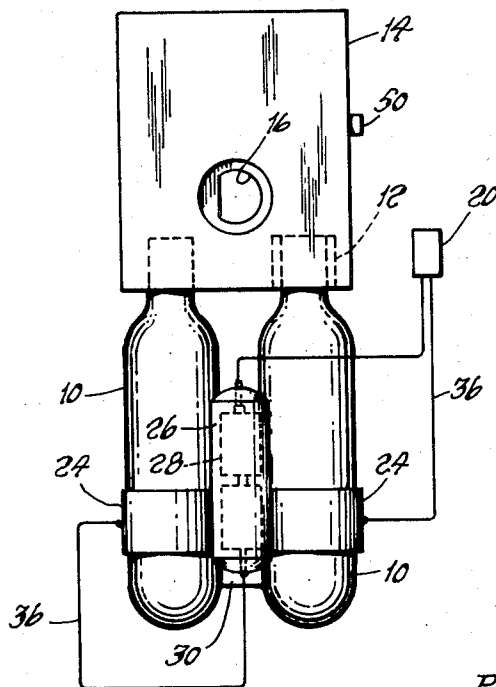


Fig. 4

INVENTOR
PAUL E. OHLSTEIN
BY *Philip Schneider*
Louis B. Gygis
ATTORNEYS

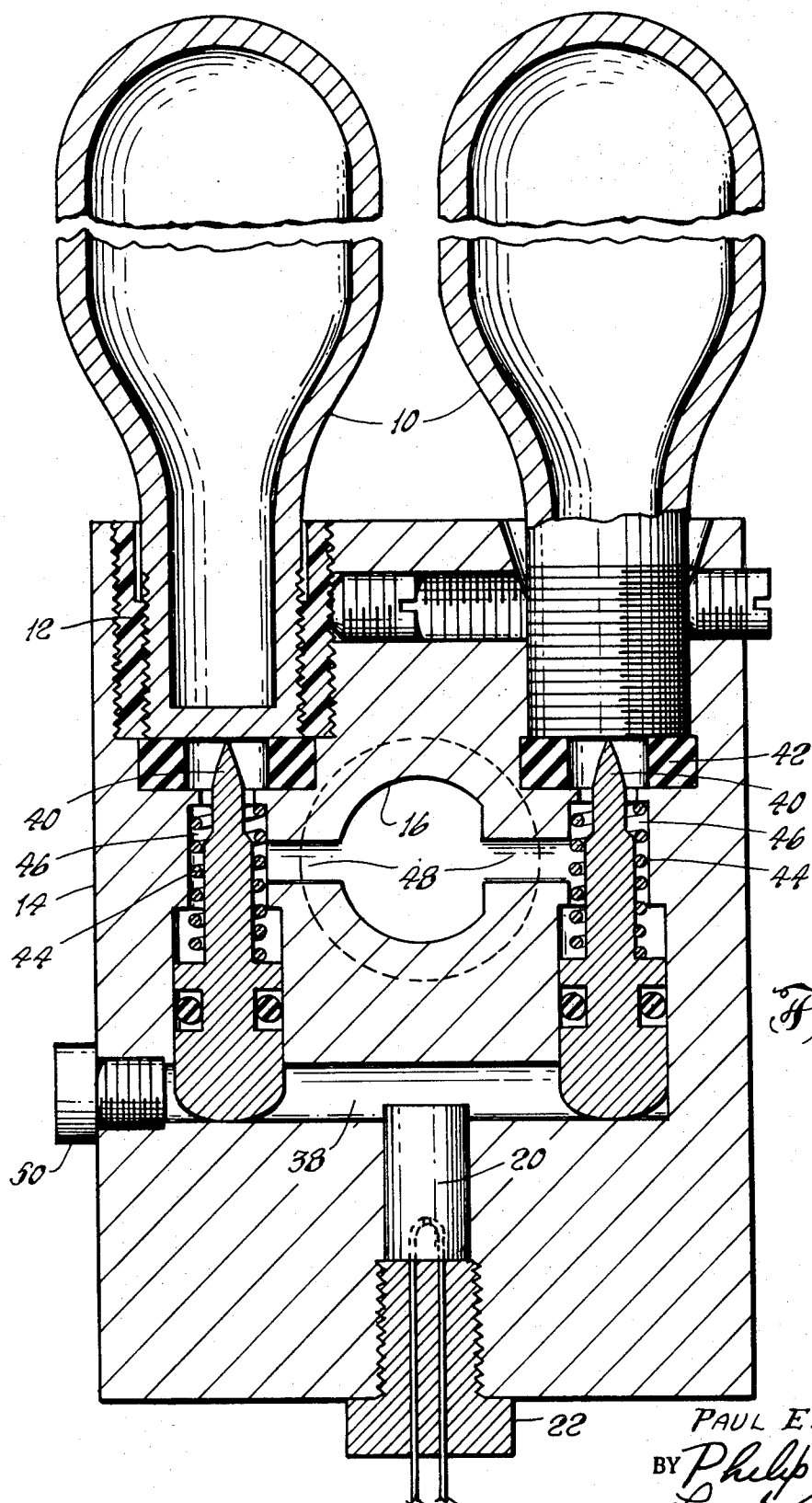


Fig. 3

INVENTOR.
PAUL E. OHLSTEIN
BY *Philip Schneider*
Don B. Gifford
ATTORNEYS

SQUIB-POWERED AUTOMATIC INFLATION DEVICE

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to an inflatable life vest and especially to one which is automatically inflatable upon immersion in sea water.

A need exists for an automatically inflatable life-preserver in the form of a vest or jacket for personnel operating on the flight decks of aircraft carriers since personnel may fall or be blown overboard. Since personnel may be injured before falling or may be stunned by the fall, automatic inflation upon immersion in the ocean is very desirable. Present types of automatically inflatable life vests are manually or battery operated. The manually operated type is reliable only when the wearer is capable of operating it, which is not always the case. The battery operated type has a leakage current problem which tends to render the battery incapable of operating the inflator when required.

An object of this invention is to provide a reliable, automatic inflator for a life vest.

Another object is to provide a sea-water-actuated, battery-powered inflator in which the battery is protected against leakage when the inflator is not actually operated.

The objects and advantages of the present invention are provided by an activation circuit which uses two gas cartridges as the two electrodes of the electrical activation circuit which energizes an explosive squib which drives piercing pins into the gas cartridges, thereby allowing the gas to inflate a life vest. Current leakage which would deplete the batteries used to energize the squib is prevented by providing an air gap between the gas cartridges.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is an exploded view of the components of an embodiment of the invention;

FIG. 2 is an illustration showing how the components fit together;

FIG. 3 is a sectional view of the CO₂ cartridges and the piston block;

FIG. 4 is a schematic wiring diagram of the electrical circuit.

The components of one embodiment of the invention comprise two gas (CO₂) cartridges 10, an insulating bushing 12 (which screws over the end of one cartridge 10 insulating it electrically from the inflator body 14 when the cartridges 10 are screwed into the inflator body 14), the inflator body 14, an explosive squib 20, a squib sealing screw 22, two contact rings 24, an insulated battery case 26, two batteries 28, an insulated separator 30, the upper and lower halves of a holding case, 32 and 34, respectively (for holding the components together in an assembly) and the requisite wiring 36.

FIG. 2 shows how the components are assembled. The cartridges 10 are screwed into the inflator body 14 and spaced from each other by the insulating separator 30, which cannot be seen here. The contact rings 24 are slipped over the cartridge bodies. The squib 20 and the squib sealing screw 22 are inserted into the squib port 18 in the inflator body 14.

FIG. 3 shows the internal details of the gas cartridges 10 and the inflator body 14. When the squib 20 is fired, the gas formed by the explosion passes through the communicating bore 38 and drives the piercing pins 40 through the sealing gaskets 42 and the lower edges of the CO₂ cartridges 10.

The return springs 44 force the piercing pins 40 back to their original position after the explosive gas subsides. This leaves a hole in the case of each cartridge 10 through which CO₂ gas from the cartridges 10 can pass and the CO₂ gas goes from the cartridges 10, into the spring space 46, into the gas

port arms 48 and into the gas port 16.

The gas port 16 is coupled to the life vest (not shown) through a conventional fitting (not shown) which contains a valve that prevents the gas from flowing back from the life vest to the gas port 16.

The small sealing screw 50 in the communicating bore 38 may have to have a small hole drilled through it, depending on the amount and type of explosive material used in the squib 20. The size of the hole is easily determined by a little experimentation. It must be small enough that the explosive force will not be dissipated before the pins 40 pierce the cartridges 10, yet large enough to prevent the explosive force from damaging the springs 44, so that the pins 40 will be retracted from the cartridges 10 after the explosion. If the explosive force is in the proper range of values for the mechanical characteristics of the cartridge metal and the springs, the hole in the sealing screw 50 is not needed.

The other components shown in FIG. 3, such as screws and O-rings, are not described herein since they do not bear on the essence of the invention and are conventional elements.

The wiring diagram is shown in FIG. 4. One side of the batteries 28 goes to the squib 20. The return wire from the squib 20 goes to one of the contact rings 24 which encircles the gas cartridge 10 which has the insulating bushing 12 around its screw end. The other side of the batteries (which are in series) goes to the second contact ring 24 which encircles the other gas cartridge 10. Thus, the gas cartridges 10 become electrodes through which leakage does not occur even in humid environments. However, when the unit is immersed, sea water fills the space between the charged electrodes (gas cartridges) and completes the circuit so that current flows through the squib 20 and explodes the charge (e.g., Dupont lead salt).

It should be noted that the gas cartridges themselves are part of the firing circuit and are separated by an air gap, thus efficiently preventing discharge of the batteries by leakage current.

I claim:

1. Automatic inflation means for a life vest or the like comprising, in combination:

a pair of cartridges containing gas under pressure and formed from electrically conductive material;
an explosive squib;
piercing-pin means;
retraction means;

an inflator body formed with a pair of gas-cartridge openings that nest the cartridges, a gas port, communication passages between said gas-cartridge openings and said gas port, an opening for an explosive squib that nests the squib, openings that nest said piercing-pin means and retraction means; and communication passages between said explosive-squib opening and said piercing-pin means openings;

said piercing-pin means being located by their openings adjacent to said cartridge openings so that when said explosive squib is fired, explosive gas pressure from said squib forces said piercing-pin means to pierce said cartridges, said retraction means pull said piercing-pin means out of said cartridges when said explosive gas pressure subsides thereby allowing the gas from said cartridges to pass through said gas port to inflate the life vest;

said gas-cartridge openings being spaced from each other so that when said gas-cartridges are inserted, an air gap exists between them;

insulator means for electrically insulating one of said cartridges from said inflator body;

battery means; and

wiring means for wiring in series one said cartridge, said battery means, said explosive squib and said other cartridge, so that said cartridges constitute charged electrodes between which current flows when said electrodes are immersed in sea water.