SUBMARINE SIGNAL BOMB

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Fig. 1.

Fig. 2.

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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 therefor or therefor.

This invention relates to emergency signaling devices and more particularly to such devices that are self-contained and adapted for daytime signaling for communication or as an aid in the location of damaged submerged submarines or other vessels or aircraft, particularly in bodies of water.

Numerous devices have been provided for a similar purpose but they were subject to deterioration, were unreliable in use and the time element between firing and release of the signal could not be accurately preset before the device was fired.

One preferred embodiment of the present invention consists essentially of a bomb which can be fired from a submarine below the surface to indicate by any one or a combination of various colors certain messages which can be observed by surface craft or aircraft. The structure employed is a trigger mechanism having a hatch which releases a firing pin for breaking a frangible disc permitting water to enter a chamber containing a water-activated battery. The voltage generated by the battery on contact with water is transmitted through suitable wires to an electric exploder which ignites a fuse having a predetermined length to determine the time of delay between firing from the submarine and discharge of the surface of the water. A small charge of black powder is attached to the end of the fuse and provides just sufficient pressure to force the end cap off of the bomb tube and eject the quantity of water-marking dye to color the surface of the water.

One object of the present invention is to provide a signaling device which is particularly useful for daytime signaling in a body of water and will provide a visual signal in the form of coloration of the water above or near a submarine or other body submerged or floating in the water.

Another object of the present invention is to provide a signaling device which is self-contained and is capable of storage for long periods of time without deterioration so that it is available for instant use whenever needed.

A further object of the present invention is to provide a signaling device which is reliable in operation under the severe conditions of shock, internal and external pressure, temperature and moisture during actual operation.

A still further object of the present invention is to provide a signaling device which may be ejected from a submarine at various depths and wherein the time element may be readily and quickly varied just prior to firing so that the signaling means will be released after any desired time interval, preferably shortly after but not prior to the device reaching the surface.

Still another object of the present invention is to provide a signaling device wherein the powdered dye is released in the most advantageous manner near the surface of the water but without scattering the powder in the air.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a pictorial view of a signal bomb with a portion of the casing broken away to show the interior arrangement of parts and illustrating one preferred embodiment of the present invention; and

Fig. 2 is a sectional view of one end portion of the signal bomb and illustrating the details of construction of the trigger mechanism and the water activated battery.

Referring now to the drawings in detail and more particularly to Fig. 1, a submarine signal bomb is shown illustrating one preferred embodiment of the present invention and consists of an outer casing 10 having a trigger mechanism 12 mounted on a sealing cap 14 to which is also secured a container 16 for the water activated battery or electrical sea cell 18 shown in Fig. 2.

The outer casing 10 also houses the electrical exploder mechanism 20 connected to the sea cell 18 by wires 22 and 24 and operatively joined to a fuse 26 the other end of which extends through a closure 28 for a receptacle 30 containing a charge of black powder or other suitable explosive 32. A bag of sea marking dye 34 is also mounted within the container adjacent the black powder charge 32 and adjacent a removable end cap 36 for the container 16 which is adapted to be blown off by the pressure created by the burning of the black powder 32 to release the bag of dye 34. The trigger mechanism 12, sealing cap 14 and the container 16 containing the sea cell 18 are shown more clearly in the detailed section of Fig. 2.

The sealing cap 14 is provided with a peripheral groove 40 which is adapted to receive an O-ring or other sealing ring 42 for maintaining a water-tight contact with the outer casing 10. An annular groove 44 on the inside surface of the sealing cap 14 is adapted to receive another O-ring or similar sealing ring 46 for maintaining a water-tight contact between the container 16 and the end cap 14. Another annular groove 48 on the outer surface of the sealing cap 14 is adapted to receive an O-ring or other sealing ring 50 for maintaining water-tight contact with the trigger mechanism 12 which is adapted to be screwed into the internally-threaded bore 52 in the sealing cap 14 by means of an externally-threaded projection 54 on the mounting plate 56 which is also provided with a pair of bifurcated posts 58 and 60.

Trigger 62 is mounted between the arms of post 58 on a pivot 64 and is provided with a firing pin 66 which is adapted to penetrate the frangible disc 68. Disc 68 is retained in a recess in the plate 56 against a sealing washer 70 by means of a flanged bushing 72 which is retained in position by screws 74. Trigger 62 is adapted to be released by a tripper 76 which is also mounted between the arms of post 58 on a pivot 78.

The outer ends of trigger 62 and tripper 76 operate between the guide arms of post 60, the tripper being adapted to be held in the position shown in Fig. 2 by a safety pin (not shown) extending into a bore 80 and resiliently mounted in the boss 82, as illustrated in Fig. 1. A retaining key 84 is adapted to be pulled out just prior to use to permit the safety pin to disengage the tripper 76 being urged outwardly by resilient means (not shown) within the boss 82.

The projection 86 on the end of the tripper 76 extends beyond the edge of the plate 56, post 60 and the outer casing 10 and is adapted to be engaged as the bomb is expelled from the submarine for releasing the trigger 62 to be activated by the spring 88 for breaking the frangible
disc 68. Water may then enter through the bore 90 into
the container 16 to activate the sea cell 18.
Sea cell 18 may be of any commercially available type
which does not generate a voltage when dry, but is adapted
to generate a small voltage usually about three volts on
contact with water even after a very long period of
storage. The terminals of sea cell 18 are connected to
connectors 92 and 94 extending through the bottom of
the container 16 and hermetically sealed therein.

The electric exploder 20 and fuse 26 may also be ob-
tained commercially and are usually provided as an as-
sembled unit with a long length of fuse which may be
cut to any desired length. The fuse burns slowly at a
very uniform rate so that by cutting the proper length
of fuse 26 attached to the exploder 20 any desired time
interval may be obtained from the moment the bomb
is discharged until it is exploded.

The bomb is designed to be extremely buoyant which
causes a rapid rise to the surface of the water as soon
as it is discharged from the submarine gun. From
knowledge of the rate of rise of the bomb and the depth
of submergence of the submarine, the time required for
the bomb to reach the surface may be readily determined
and the fuse 26 cut to the proper length.

Operation
In the use of the device the fuse 26 is cut to the proper
length from the exploder 20 in accordance with the pro-
cedure noted supra and the cut end is inserted in the
closure 28 of the explosive receptacle 30. The sealing
cap 14 with the trigger mechanism 12 attached may be
quickly inserted in the outer casing 10, the retaining key
84 removed to arm the trigger mechanism 12 and the
bomb inserted in the discharge tube for firing.

As the bomb is fired the projection 86 is engaged by
an abutment in the discharge tube (not shown) releasing
trigger 62 which is driven by the spring 88 so that the
firing pin 66 breaks the frangible disc 68. As soon as the
bomb enters the water, the water will pass through the
bore 90 into the container 16 and will activate the sea
cell which, in turn, will fire the exploder 20 and start
the burning of the fuse 26. After the fuse 26 has burned
for the predetermined interval of time, the charge of
black powder or other explosive 33 is set off, preferably
after the bomb has reached the surface and is lying flat
on the surface of the water, so that as it explodes the
bag of powdered dye 34 is expelled into the water with
little or no dye being lost in the air.

It will be apparent that the amount of black powder
or explosive 33 required will be dependent on the specific
design of the bomb, particularly the manner in which
the end cap 36 is attached to the outer casing 10, and
should be such that the pressure developed will be just
sufficient to force off the end cap 36 and expel the bag
of dye 34 into the water.

While it is preferred to use a bag of loose powdered
dye for signaling purposes, the dye charge may alter-

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