

March 19, 1963

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3,081,466

SCUTTling DEVICE

Filed Aug. 28, 1962

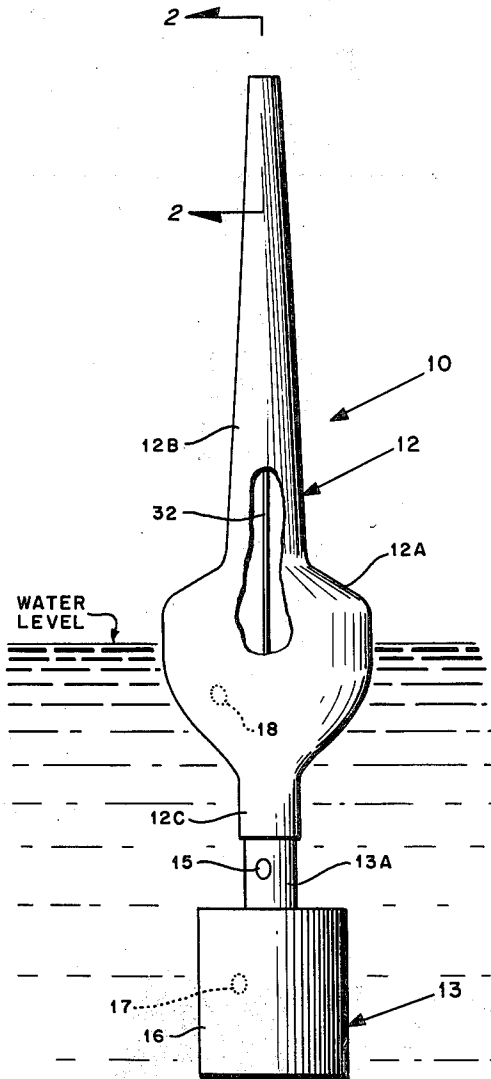


Fig. 1

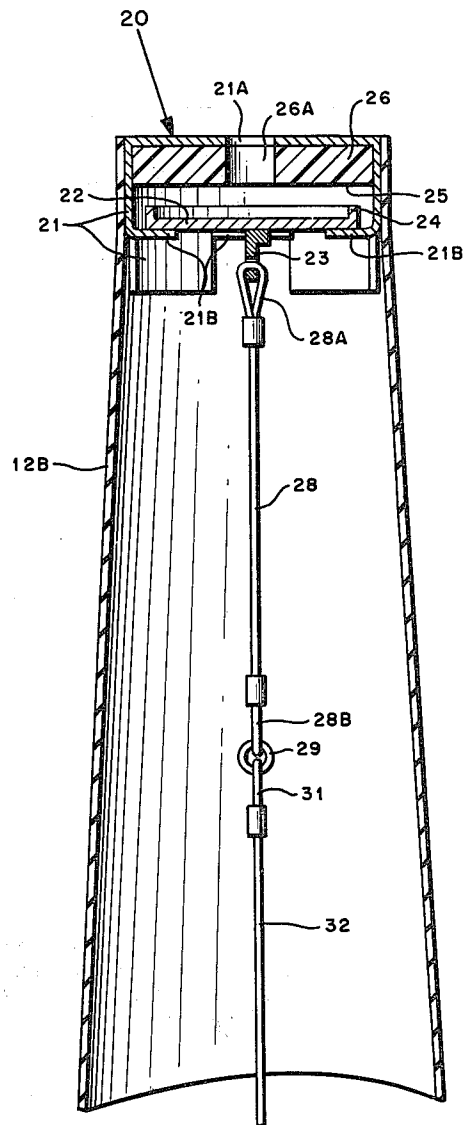


Fig. 2

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3,081,466

SCUTTILING DEVICE

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Filed Aug. 28, 1962, Ser. No. 220,100

10 Claims. (Cl. 9—8)

(Granted under Title 35, U.S. Code (1952), sec. 266)

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.

The present invention relates to the scuttling of any floating device such as a sonobuoy and more particularly to scuttling a sonobuoy utilizing a pressurized external flotation member such as an air or other gas-inflated balloon which maintains equipment a specified distance below the water surface.

Sonobuoys of the character known in the prior art are used primarily in searching for underwater objects such as submarines and in the oceanographic surveys of currents, depth, salinity, temperature and radiation. When the signals from the sonobuoys have served this purpose, the sonobuoys can be reclaimed in any suitable manner. However, this is usually not worth the time and risk that may be involved under circumstances which may prevail when the sonobuoys are used. Accordingly, it is preferred to consider the sonobuoys as expendable. It is desired that the sonobuoys stop sending signals after serving their useful purpose, and also that the sonobuoys sink themselves so that they cannot be retrieved by the enemy or other unauthorized persons.

Accordingly, it is an object of the present invention to provide an improved output signalling apparatus having an external flotation member such as an air or other gas-inflated balloon, which external flotation member is equipped with a scuttling device by means of which the inflated balloon becomes water-logged after a predetermined time of use and by means of which the entire apparatus then sinks to the bottom of the sea.

Another object of the invention is to provide for the scuttling of an external flotation means with a safe non-explosive device and which is inexpensive to manufacture, lightweight and reliable in operation.

Various other objects and advantages will appear from the following description of one embodiment of the invention and the most novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawing:

FIG. 1 illustrates a sonobuoy in elevation in an operative condition for detecting underwater sound and having a section cut away to illustrate a balloon-erected antenna therein.

FIG. 2 illustrates a section taken on lines 2—2 of FIG. 1.

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is illustrated in FIG. 1 an erected sonobuoy shown generally at 10 and constructed in two main sections which are denoted as external flotation member 12 and radio transmitting apparatus 13. The external flotation member is inflated by means of a capsule, not shown, containing compressed gas which arrangement is well-known in the prior art. This flotation member has an enlarged bottom section 12A, providing the necessary air space to cause the sonobuoy to float, and an upper conical section 12B which remains above the surface of the water when the device is in the inflated condition. The lower portion of the enlarged bottom

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section has a sleeve portion 12C connected to the neck 13A of the radio transmitting apparatus canister 16.

The parts of the external flotation member are preferably made of fabric covered with rubber, plastic or other suitable material and the lower end of the conical section is secured to the upper surface of the enlarged section by heat sealing, stitching, or other means.

The neck 13A may be provided with a plug 15 extending therethrough, the plug being of the soluble type and dissolvable either in water or by electrolytic action caused by battery leakage on a metallic plug. These plugs are well known in the prior art and further description thereof is considered unnecessary. The soluble plug may be alternatively placed within the canister 16 as designated by the dotted line at 17 or may be provided on the enlarged bottom section 12A as is shown in FIG. 1 by dotted line at 18. These plugs are operable to be dissolved within a specified set time and are located below the water level as shown in FIG. 1.

Within the canister 16 is connected the lower end of the antenna 32, the antenna being erected upon inflation of the flotation member 12. The upper portion of the antenna 32 is connected to a valve arrangement as best seen in FIG. 2.

As illustrated therein, the valve is generally denoted by the numeral 20 and is cemented to the inner surface of the upper portion of conical section 12B. Valve 20 is constructed in the form of a hollow cylindrical casing 21 having an aperture 21A formed at one end thereof and having horizontally extending struck tabs 21B pressed from the lower side wall of the cylindrical casing at the other end thereof. The struck tabs 21B form a shelf upon which rests a wafer-like, flat, circular disc member 22. The inwardly facing side of disc member 22 has tack welded in the center thereof an elbow connector 23 and the outwardly facing surface of the disc member is formed about the periphery thereof with a flange 24 for engagement with the inwardly facing surface 25 of a plastic, rubber, or otherwise resilient valve seat or annular member 26. This valve seat 26 has formed in the central portion thereof an aperture 26A which is in registration with the aperture 21A formed in the one end of cylindrical casing 21.

The connection between the antenna 32 and the valve structure 20 is made through elastic element 28 which has one end looped as at 28A and connected to the elbow connector 23 and looped at its other end as at 28B to a ring member 29 which in turn has a looped end 31 of the antenna 32 connected thereto.

The elastic element 28 is so designed and constructed that the restoring force thereof is insufficient to urge the wafer-like disc member against the shelf formed by the tabs 21B when the pressure within the external flotation member is above a predetermined value. This value is reached upon the discharge of the compressed gas bottle, not shown, and as result thereof the forces acting upon the inwardly facing surface of the disc member 22 will urge the flanges 24 of the disc member into engagement with the resilient annular member 26 thereby closing the vent formed by apertures 21A and 26A constructed in members 21 and 26, respectively. The valve is then in the closed position.

As is readily seen, when the internal pressure within the balloon falls below the predetermined and set pressure, the restoring force of the elastic element 28 will be sufficient to overcome the forces acting against the disc member 22 and as a result thereof, the disc member 22 will be drawn against the shelf formed by the tabs and accordingly the flanges 24 will be disengaged from the resilient annular member 26. This arrangement opens the valve and allows any air or other gas within the balloon

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to be vented to the atmosphere through apertures 21A and 26A.

The drop in pressure is accomplished by the dissolving of the plug 15 which is placed below the water level, and as will be made clear by the description of the operation which follows, the cooperative arrangement between the plug, valve, and elastic member permits the sonobuoy to be scuttled.

The operation of this device is as follows: Prior to the jettisoning of the sonobuoy device from the airplane, the apparatus is in the form of a compact package. Upon jettisoning, a gas capsule, not shown, is actuated whereby air or other gas under high pressure entering the external flotation member erects the enlarged portion and conical section. The pressure entering the conical section urges the wafer-like disc member 22 against the resilient valve seat 26 thereby sealing the aperture 26A in the valve seat. As long as the pressure within the container exists at a level sufficient to overcome the restoring force of the elastic element 23, the valve will be maintained in the closed position.

However, after being submerged in the water for a predetermined time, the soluble plug 15 will dissolve thereby allowing the gas under pressure within the external flotation member to escape through the opening formed by the soluble plug 15. When the pressure within the external flotation member decreases to a value wherein the restoring force of the elastic element 23 exceeds the force set up by the internal pressure acting against the inwardly facing surface of the wafer-like disc member 22, the valve will be urged to an open position. Therefore, when the water enters through the hole formed by the dissolved plug and rises within the external flotation member, the air that would normally be entrapped in the upper surface of the conical member is able to be evacuated through the apertures 21A and 26A by reason of the open valve arrangement. As a result thereof, the sonobuoy will be scuttled.

It should be understood, of course, that the foregoing disclosure relates only to one embodiment of the invention and that numerous modifications and variations may be made therein without departing from the spirit and the scope of the invention as set forth in the appended claims.

What is claimed is:

1. A scuttable buoy comprising in combination: an inflatable balloon having a bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere, and means operatively connected to said balloon for sequentially establishing communication from inside of said balloon to the liquid and to the atmosphere above the liquid, respectively.

2. A scuttable buoy comprising in combination: an inflatable balloon having a bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere, time delay means operatively connected into said bottom section for establishing communication from inside of said balloon to the liquid, and pressure responsive means operatively connected to said upper section for establishing communication from inside of the balloon to the atmosphere.

3. A scuttable buoy comprising in combination: an inflatable balloon having a bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere, time delay means operatively connected to said bottom section for establishing communication from inside of said balloon to the liquid, pressure responsive means operatively connected to said upper section and operable between an open and closed position for establishing communication between the inside of the balloon and the atmosphere, and force exerting means connected between said balloon and said pressure responsive means for urging said pressure responsive means to said open position.

4. A scuttable buoy comprising in combination: an in-

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flatable balloon having a bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere, time delay means operatively connected in said bottom section for establishing communication from inside of said balloon to the liquid, an escape valve secured to said upper section of said balloon and operable between an open and closed position and including means within said valve responsive to a change in pressure for establishing communication between the inside of the balloon and the atmosphere, and force exerting means connected between said balloon and said pressure responsive means for urging said valve to said open position.

5. A scuttable buoy comprising in combination: a non-buoyant object, an inflatable balloon connected to said object and having a bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere, and means operatively connected to said balloon for sequentially establishing communication from inside of said balloon to the liquid and to the atmosphere above the liquid, respectively.

6. A scuttable buoy comprising in combination: a non-buoyant object, an inflatable balloon connected to said object and having a bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere, time delay means operatively connected to said bottom section for establishing communication from inside of said balloon to the liquid, pressure responsive means operatively connected to said upper section and operable between an open and closed position for establishing communication between the inside of balloon and the atmosphere, and force exerting means connected between said balloon and said pressure responsive means for urging said pressure responsive means to said open position.

7. A scuttable buoy comprising in combination: a non-buoyant object, a pressure inflated balloon connected to said object and having a bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere, time delay means operatively connected in said bottom section for establishing communication from inside of said balloon to the liquid, an escape valve secured to said upper section of said balloon and operable between an open and closed position and including means within said valve responsive to a change in pressure for establishing communication between the inside of the balloon and the atmosphere, and force exerting means connected between said balloon and said pressure responsive means for urging said valve to said open position.

8. A scuttable buoy comprising in combination: an inflatable balloon having an enlarged bottom section for extending below the level of a supporting liquid and an upper section exposed to the atmosphere; time delay means provided in said bottom section of said balloon for establishing communication between the inside of said balloon and the liquid; a valve secured at the end of said upper conical section having a hollow cylindrical member with one end opening toward the interior of said balloon and the other end forming a reduced coaxial aperture communicating with the atmosphere, a plurality of inwardly facing tabs extending from the sidewall of said cylindrical member providing a support shelf, a resilient annular member coaxially disposed within said cylindrical member and fixed to said other end thereof and having an opening therein being in registration with said aperture, a flat circular element coaxially disposed within said cylindrical member between said annular member and said tabs, a force exerting means secured between said balloon and said circular element for urging said circular element against said tabs and away from said resilient annular member; whereby when said time delay means is actuated, the release of pressure within said balloon will permit said circular element to become disengaged from said resilient washer member thereby provid-

ing an evacuation conduit for any air that becomes entrapped in said upper section when the liquid enters the balloon.

9. A scuttable sonobuoy comprising in combination: a canister containing radio equipment having a flexible antenna connected thereto; a pressure inflated balloon having an enlarged bottom section for extending below the level of a supporting liquid and an upper conical section exposed to the atmosphere, said bottom section being connected to said canister; a soluble plug provided in said bottom section of said balloon for establishing communication between the inside of said balloon and the liquid; a valve secured at the end of said upper conical section having a hollow cylindrical member with one end opening toward the interior of said balloon and the other end forming a reduced coaxial aperture communicating with the atmosphere, a plurality of inwardly facing tabs extending from the sidewall of said cylindrical member providing a support shelf, a resilient annular member coaxially disposed within said cylindrical member and fixed to said other end thereof and having an opening therein being in registration with said aperture, a flat circular element coaxially disposed within said cylindrical member between said annular member and said tabs, an elastic band secured between said antenna and said circular element for urging said circular element against said tabs and away from said resilient annular member when the balloon is not fully inflated; whereby when said soluble plug is dissolved, the release of pressure within said balloon will permit said circular element to become disengaged from said resilient washer member thereby providing an evacuation conduit for any air that becomes entrapped in said conical section when the liquid enters the balloon.

10. A scuttable buoy comprising in combination: a

pressure inflated balloon having an enlarged bottom section for extending below the level of a supporting liquid and an upper conical section exposed to the atmosphere; a soluble plug provided in said bottom section of said balloon for establishing communication between the inside of said balloon and the liquid; a valve secured at the end of said upper conical section having a hollow cylindrical member with one end opening toward the interior of said balloon and the other end forming a reduced coaxial aperture communicating with the atmosphere, a plurality of inwardly facing tabs extending from the sidewall of said cylindrical member providing a support shelf, a resilient annular member coaxially disposed within said cylindrical member and fixed to said other end thereof and having an opening therein being in registration with said aperture, a flat circular element coaxially disposed within said cylindrical member between said annular member and said tabs, an elastic band secured between said balloon and said circular element for urging said circular element against said tabs and away from said resilient annular member when the balloon is not fully inflated; whereby when the soluble plug is dissolved, the release of pressure within the balloon will permit said circular element to become disengaged from said resilient washer member thereby providing an evacuation conduit for any air that becomes entrapped in said conical section when the liquid enters the balloon.

References Cited in the file of this patent

UNITED STATES PATENTS

2,397,844	Dewhurst	Apr. 2, 1946
2,586,828	Keerau	Feb. 26, 1952
2,637,862	Treas	May 12, 1953
2,907,875	Seygang	Oct. 6, 1959