United States Patent

Heikki

[15] 3,680,160

[45] Aug. 1, 1972

[54] **FLOAT FOR SEAMARKS, BUOYS, PONTOONS AND THE LIKE**

[72] Inventor: **Tuomo Jorma Heikki,** Keiholehdentie 6, Tikkurila, Finland

[22] Filed: **Nov. 18, 1970**

[21] Appl. No.: **90,669**

[30] **Foreign Application Priority Data**

Nov. 20, 1969 Finland 3362

[52] **U.S. Cl.** .....**9/8 R**

[51] **Int. Cl.** **B63b 21/52,** B63b 51/02

[58] **Field of Search** 9/8, 9; 116/114.5

[56] **References Cited**

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Primary Examiner—Milton Buchler
Assistant Examiner—Gregory W. O'Connor
Attorney—Albert M. Parker, Lorimer P. Brooks, Alfred L. Haffner, Jr., Harold Haidt, G. Thomas Delahunty and Charles G. Mueller

[57] **ABSTRACT**

A medium having a dew point close to the freezing point of the surrounding water is enclosed in a watertight collapsible hollow body anchored to the bottom.

The collapsible body, which normally floats at the surface of the surrounding water, sinks when the freezing point of the water is approached due to the condensation of the medium. The hollow body remains submerged in a collapsed state until the water warms, vaporizing the medium and causing the body to float again.

3 Claims, 8 Drawing Figures

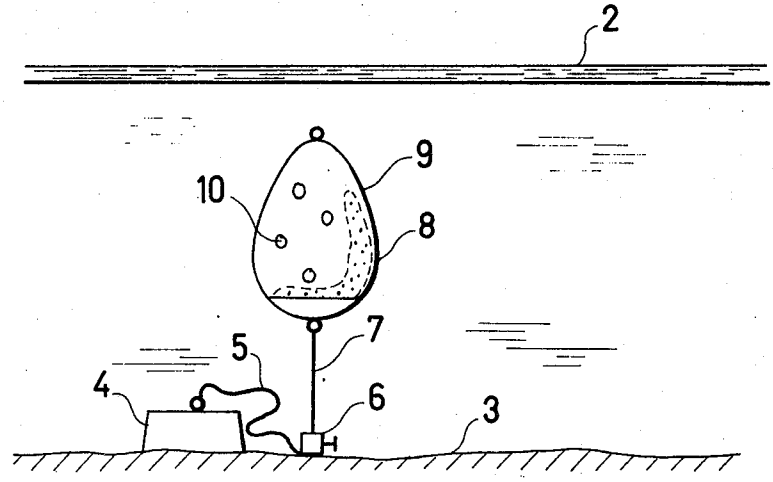


Fig. 1

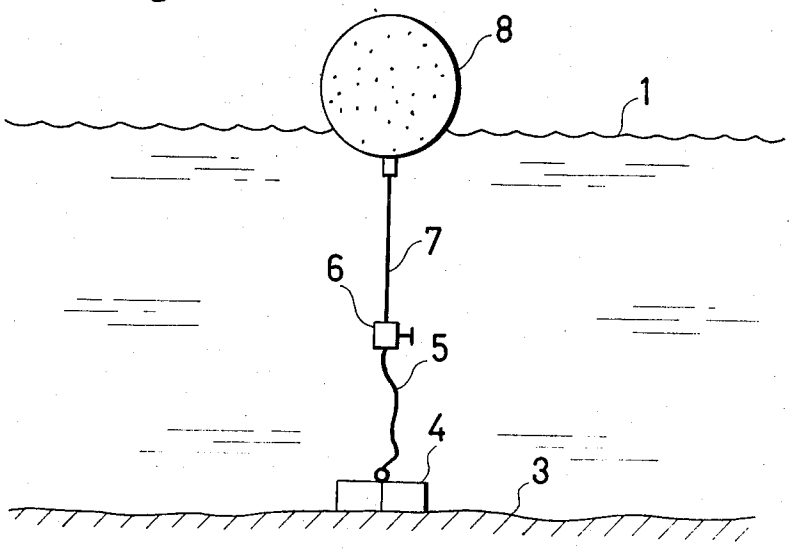


Fig. 2

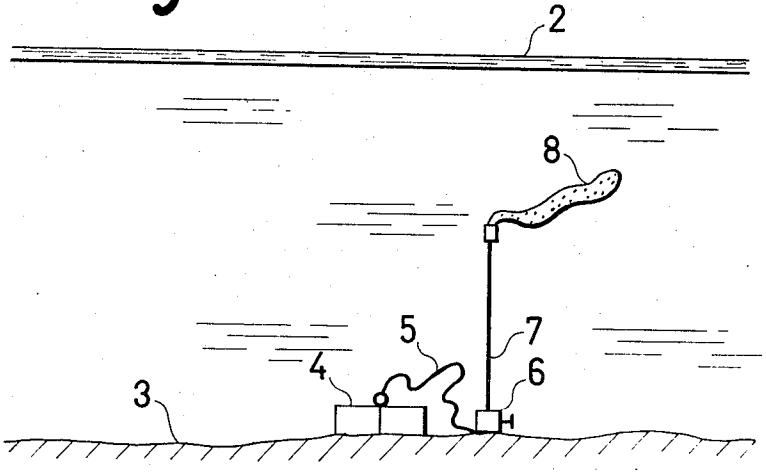


Fig. 3

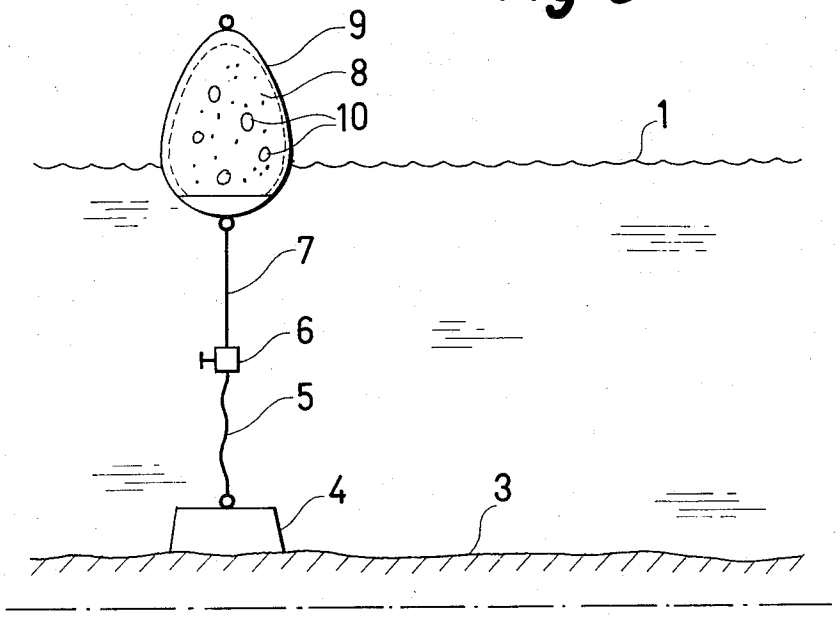


Fig. 4

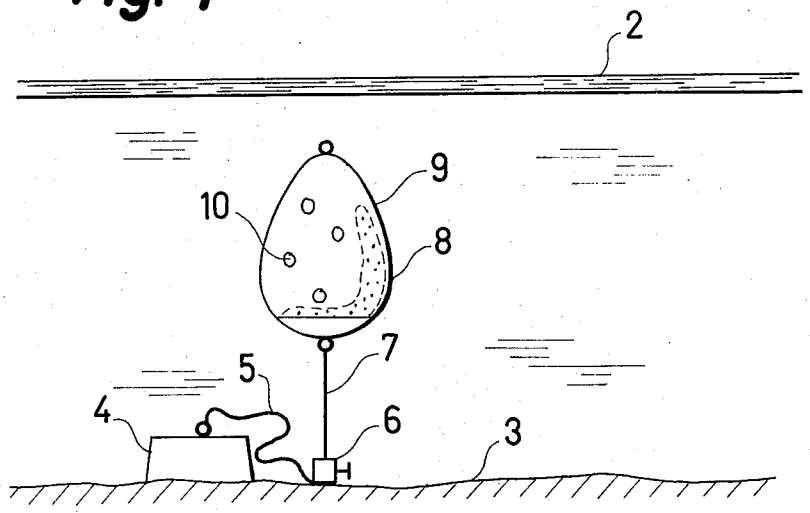


Fig. 5

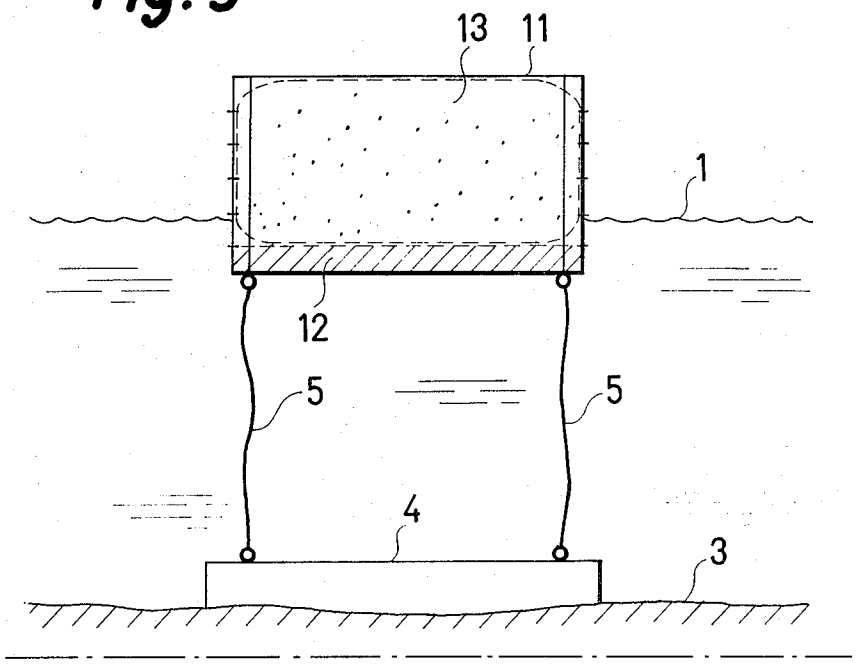


Fig. 6

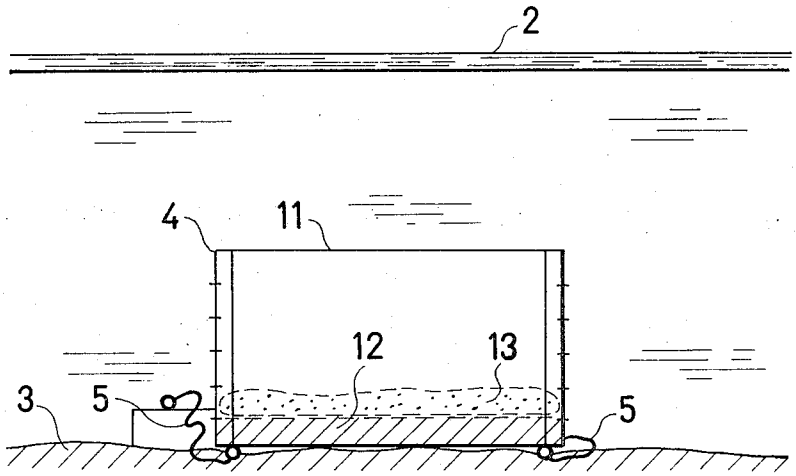


Fig. 7

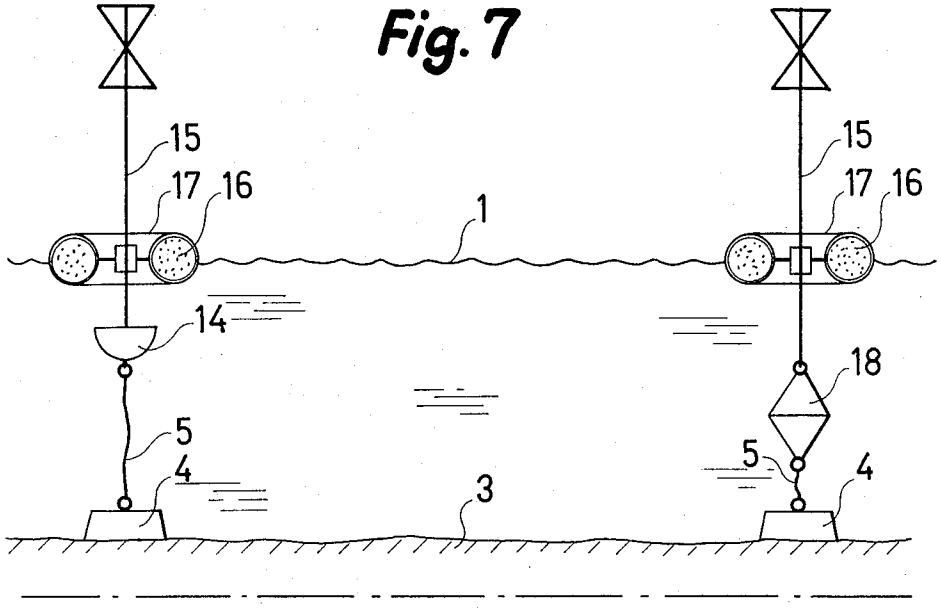
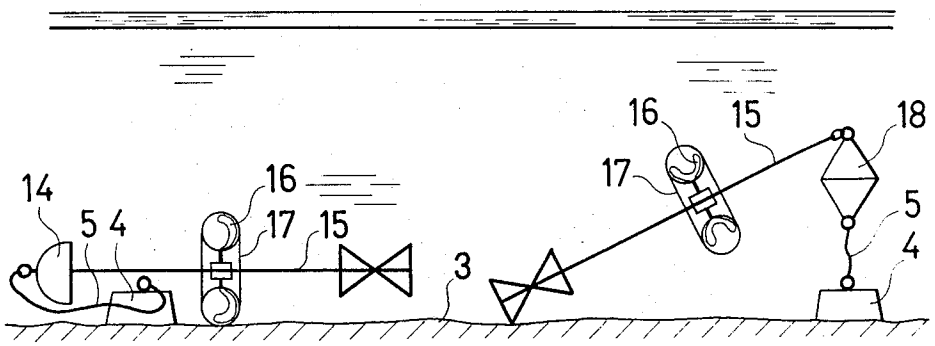


Fig. 8



FLOAT FOR SEAMARKS, BUOYS, PONTOONS AND THE LIKE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to the field of floats, especially for seamarks, such as shoal and channel marks, spar buoys, buoys, and bridge or dock pontoons.

2 Prior Art

On the latitudes where water freezes during the winter in sea and inland waters alike, the shoal and channel marks, buoys, spar buoys and floats, as well as bridge and dock pontoons, must be removed from the water before it freezes and then placed back again in the spring. Otherwise, ice will carry them away. This causes great expenses and, because of the annual trouble and expense and the great number of underwater rocks and shoals, many of them remain unmarked. Consequently, they form a continuous danger for water traffic, especially outside the officially marked channels.

The purpose of this invention is to eliminate the above inconveniences.

SUMMARY OF THE INVENTION

According to the invention there is provided a watertight collapsible hollow body which is filled with or partly consists of a medium or mixture that has a boiling point close to the freezing point of the surrounding water, in which case the float collapses to such an extent when the water temperature sinks close to the freezing point that the float submerges and returns to the surface after the water temperature has risen above the freezing point, and means for anchoring the body to the bottom.

Suitable mediums are e.g. butane and 1,2-dichlorotetrafluorethane and mixtures thereof.

A float according to the invention eliminates the necessity to remove the above-mentioned marks when water freezes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a buoy in summer, and

FIG. **2** the same buoy in winter,

FIGS. **3** and **4** show a metal-shelled buoy in summer and in winter respectively,

FIGS. **5** and **6** show a pontoon in summer and in winter respectively,

FIGS. **7** and **8** show two different applications for a spar buoy in summer and in winter respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The principle of the invention is that a mark anchored to the bottom or the floating part of the mark, such as a ball, cylinder, ring (for example, attached around a spar buoy), cushion (inside a bridge or dock pontoon), etc., is collapsible and filled with a gas that condenses before the freezing of water, that is, at about 0° C. At this time, attached to a suitable weight, it sinks under the surface of the water after collapsing and remains there over the winter. In the spring, when water warms up after the melting of ice, the vapor pressure of the condensed gas grows and the ball, etc., inflates and rises to its former place on the surface.

In the experiments, rather thick-walled plastic balls with a volume of some 4 dm^3 were used as floats. They were filled with butane and attached to a weight of 1 kg. The balls were placed in a water tank outside in freezing temperature. They collapsed and sunk, and the surface of the water in the tank froze. Brought into a warm room, the water in the tank melted and the balls returned to the surface.

In the following, the invention is described in more detail with reference to the enclosed drawings and with some practical applications as examples.

In the figures, **1** refers to water surface, **2** to ice, **3** to the bottom, and **4** to the anchor. A flexible anchor rope or chain is marked with **5**, and a stiff arm **7** provided with an additional weight **6** is attached to the free end of the anchor rope (FIGS. **1–4**).

FIGS. **1** and **2** show a spherical buoy **8** made of some flexible material, such as plastic. When water is warm and buoy fills with vapor and stays afloat, but when water freezes in the fall the vapor pressure decreases, and when the temperature of water reaches the dew point of the gas inside the ball, the gas condenses, and the ball collapses and sinks to the bottom. With the weight **6** and the arm **7** the buoy can be prevented from sinking too deep and, thus, as the upper layers of water warm up sooner in the spring and, also, as the pressure caused by water is smaller closer to the surface, the liquid inside the ball vaporizes earlier than if it were at the bottom, and the buoy returns to the surface.

In the buoy shown in FIGS. **3** and **4**, the process is the same as above, but the structure is applicable to anchoring buoys for ships and boats. It consists of a ball **8** containing material that vaporizes at a lower temperature and of a metal shell **9** around the ball, provided with holes **10** so that water can enter the shell when the ball **8** collapses in the fall.

FIGS. **5** and **6** show an application that can be used as a pontoon. It consists of, for example, a metal barrel **11**, the ends of which are provided with holes. Inside the barrel there is a weight **12** cast of, for example, concrete. A watertight collapsible bag **13** containing material that vaporizes at a low temperature is fitted inside the barrel. When the temperature of water is above the boiling point of the material, the pontoon floats on the surface but when the temperature of water sinks below the boiling point, the vapor inside the bag **13** vaporizes and the pontoon sinks to the bottom, from where it returns to the surface under the influence of the lifting power of the vapor-filled bag after the temperature of water has risen high enough.

FIGS. **7** and **8** show two examples of the application of the invention to a spar buoy. These applications differ only in the anchoring arrangements. In the first application, the upper end of the anchor chain **5** has been attached to the lower end of the spar **15** provided with a hemispherical weight **14**. A float **17** letting water through and provided with a ringlike collapsible bag **16** is attached to a suitable height of the spar. In this application the spar buoy sinks to a horizontal position on the bottom **3** in the winter.

In the second application, a normal float **18** has been attached to the upper end of the chain **5** attached to the float. In this application, the float **17** provided with a bag **16** remains in winter at a desired depth under the ice **2** so that the rising to the surface of the spar buoy takes place earlier than in the fist case.

The hollow spar of the spar buoy can also be provided with a collapsible bag containing material that boils at a low temperature, and thus the spar itself serves as a float.

What is claimed is:

1. A float for seamarks, buoys and pontoons, comprising:

a watertight collapsible hollow body containing a medium having a dew point close to the freezing point of the surrounding water so that when water temperature decreases close to the freezing point thereof the body collapses and the float submerges, returning to the surface after the water temperature has risen above its freezing point; and means for connecting the float to bottom.

2. The float as recited in claim 1, wherein the medium comprises at least one compound selected from the group consisting of butane and 1,2-dichlorotetrafluorethane.

3. The float as recited in claim 1, wherein the collapsible body comprises: a rigid apertured frame structure; and a bag of flexible material inside the frame structure.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,680,160 Dated August 1, 1972

Inventor(s) Tuomo Jorma Heikki Sihvo

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

At page 1, the title page, line 2, the inventor's name should be --SIHVO--.

At item [72] on the title page, the inventor's name should read --TOUMO JORMA HEIKKI SIHVO--.

Signed and sealed this 26th day of December 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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