March 12, 1957 P. W. KAJMO 2,784,559

PRESSURE EQUALIZING DIVING BELL

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Fig. 1

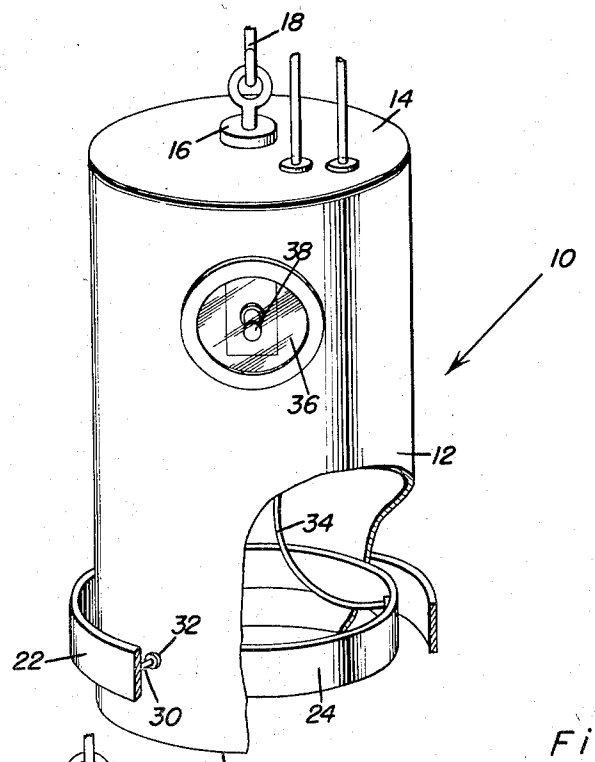


Fig. 2

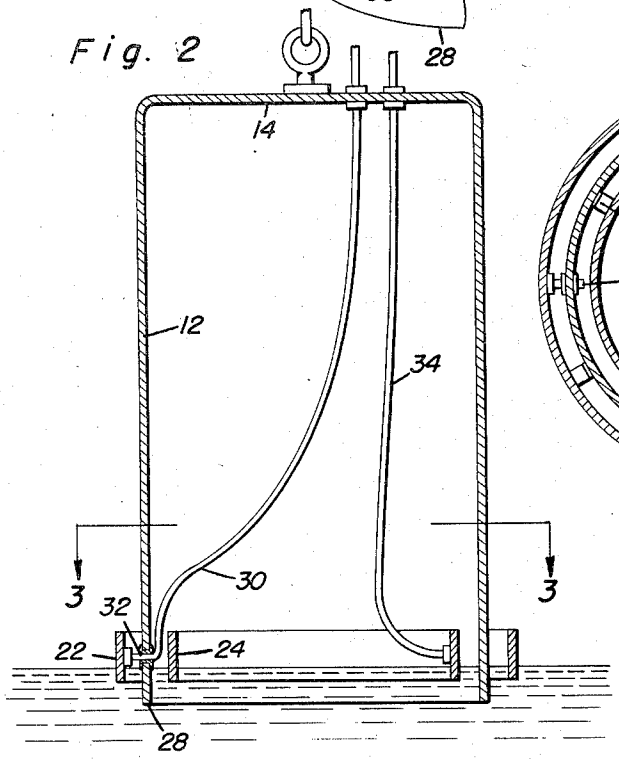
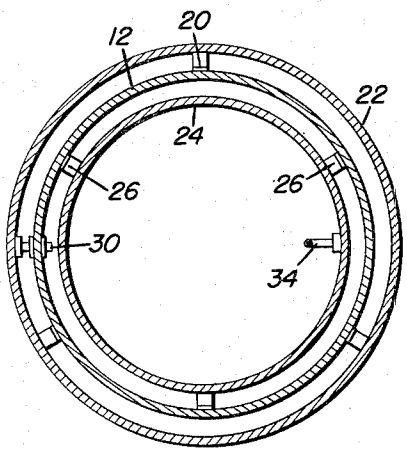


Fig. 3



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PRESSURE EQUALIZING DIVING BELL

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8 Claims. (Cl. 61—69)

This invention relates to an apparatus for submarine exploration and more particularly to a diving bell having mounted therein suitable cameras and photographic equipment whereby data can be recorded concerning the life of the denizens of the greater depths.

The primary object of this invention resides in the provision of diving bell having means associated therewith whereby as may be necessary, gas can be generated into the diving bell to maintain the level of water within the diving bell at a predetermined gradient. In the prior art diving bells, one of the great difficulties reside in the fact that when great depths are achieved, the water will enter from the bottom or open end of the diving bell to compress the gas retained within the diving bell to a comparatively small compass thus reducing the amount of space available for equipment utilized in recording data.

It is the concept of the present invention to generate gas to occupy a considerably greater volume of the diving bell then heretofore had been possible thus, maintaining the water at a given or desired level.

The construction of this invention features the use of an anode on the outside of this bill and a cathode there within whereby upon contact of fluid with the anode and cathode, the electrolytic separation of hydrogen and oxygen will be achieved, the hydrogen remaining in the diving bell and adapted to prevent the deterioration of the cameras and photographic equipment from corrosion while the oxygen is permitted to escape to the surface of the body of water within which the diving bell is immersed.

Still further objects and features of this invention reside in the provision of a pressure equalizing diving bell that is comparatively light in weight, simple in construction, easy to utilize, and which is capable of providing increased space for instruments, cameras, and the like.

These, together with the various ancillary objects and features of the invention which will become apparent as the following description proceeds are attained by this diving bell, a preferred embodiment of which has been illustrated in the accompanying drawings, by way of example only, wherein:

Figure 1 is a perspective view of the diving bell comprising the present invention, parts thereof being broken away to show other parts in detail;

Figure 2 is a vertical sectional detail view illustrating the manner in which the anode and cathode are connected to conductors which extend through the top of the diving bell and are electrically operatively connected to a generator or other source of electrical current above the surface of the body of water within which this diving bell is immersed; and

Figure 3 is a horizontal sectional view as taken along the plane of line 3—3 of Figure 2.

With continuing reference to the accompanying drawings wherein like reference numerals designate similar parts throughout the various views, reference numeral **10** generally designates the diving bell comprising the present invention. This diving bell **10** includes a preferably cylindrical container **12** having a top wall **14** to which a

fitting **16** is attached, the cable or chain **18** used in raising and lowering the diving bell **10** being attached to the fitting **16**. It is intended, because of the construction of this invention to utilize comparatively light weight metal for the construction of the container **12**, the weight of metal being satisfactory to insure a controlled and proper rate of descent of the diving bell through the water.

The container **12** has attached thereto by suitable insulated connecting members and spaces **20** an anode **22** of cylindrical configuration which is concentric with the container **12**. A cathode **24** is positioned within the container **12** and held in spaced relationship therefrom by insulative spacers **26**. It is to be noted that both the anode and cathode are spaced from the lower edge **28** of the container **12** for a purpose which will be clarified as this description ensues. Connected to the anode **22**, is a conductor **30** which extends through an aperture **32** in the side walls of the container **12**, the aperture being guarded against flow of water by means of suitable gaskets and fittings, the conductor **30** also extending through the top wall **14** of the container **12** and being connected to a suitable source of electrical power, such as a high capacity generator on a vessel floating on the surface of the water within which this device has been lowered.

The anode **22** is connected by means of a suitable conductor **34** to the source of electrical power and extends through the top wall **14** of the container **12**. Means are utilized to insure against escape of gas from the confines of the container **12** or the influx of water thereinto at the points where the conductors **30** and **34** extend through the walls of the container **12**. The container **12** may be provided with a port or window **36** therein and within the confines of the container **12**, there are mounted cameras, as at **38**, which are adapted to take pictures through the port **36** and other instruments may be confined within the container **12**.

The bell **10** together with the equipment, such as cameras **38** installed therein is of a greater weight than the weight of an equal volume of water displaced by the diving bell when the diving bell is in an immersed position. This assures that the diving bell will always sink readily and smoothly to any desired level. It is to be recognized that as the diving bell sinks lower, the gas pressure in the diving bell will increase and thus there will be an additional amount of gas and hence weight of gas within the diving bell thus in fact increasing the weight of the diving bell. There is no need for a ballast system for the diving bell though of course, if a very large diving bell were to be constructed, such may be desired. The diving bell with its associated equipment is heavier than the volume of water displaced and hence will readily sink. It is merely raised or lowered to its desired depth in the water or out of the water as may be desired.

In operation, as the bell is lowered into the water, the increasing pressure forces water up into the opening in the bottom of the bell. When the water comes into contact with the cathode on the inside of the bell, an electrically operative circuit is closed and current flows through the electrodes using the water as an electrolyte. The effect of electrolysis will be such that different gases are given off at each electrode. The gas from the anode is allowed to escape, this is, of course, preferably oxygen and so any possible reaction that might occur from the intermixing of the oxygen with the hydrogen emanating from the cathode is prevented. Hydrogen from the cathode **24** is collected within the bell. As more water is pushed into the bell by the increasing pressure on lowering of the bell, more hydrogen gas is evolved at the cathode, forcing the water level inside the bell back downwardly and into a state of equilibrium, the hydrogen gas pressure balancing the waters depth pressure. It is

to be understood that the bell must be lowered at a given rate, dependent, of course, upon the amount of the electrical power utilized which of course, determines the rate of production of the hydrogen. It is to be noted that the concentric rings 22 and 24 forming the anode and cathode respectively, have been utilized in order to provide the maximum effective anode and cathode surface.

When the bell is raised, the gas pressure inside the bell escapes through the opening in the bottom as the water pressure decreases. This action automatically reduces the pressure inside the bell as it is being raised. It is to be understood that cameras and other equipment inside the bell must have equalizing apertures therein thereby avoiding collapse.

Since from the foregoing, the construction and advantages of this diving bell, for use at great depths, are readily apparent, further description is believed to be unnecessary.

However, since numerous modifications will readily occur to those skilled in the art, after a consideration of the foregoing specification and accompanying drawings, it is not intended to limit the invention to the precise embodiment shown and described, but all suitable modifications and equivalents may readily resort to which fall within the scope of the following claims.

What is claimed as new is as follows:

1. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell on the outer surface thereof, a cathode secured to said diving bell on the inside of said diving bell, and conductors connected to said anode and said cathode electrically connected to a source of electrical power.

2. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell concentric with said diving bell on the outer surface thereof and insulated therefrom, a cathode secured to said diving bell on the inside of said diving bell, and conductors connected to said anode and said cathode electrically connected to a source of electrical power.

3. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell concentric with said diving bell on the outer surface thereof and insulated therefrom, a cathode secured to said diving bell on the inside of said diving bell, said cathode being concentric with said diving bell and said anode and conductors connected to said anode and said cathode electrically connected to a source of electrical power.

4. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell concentric with said diving bell on the outer surface thereof

and insulated therefrom, a cathode secured to said diving bell on the inside of said diving bell, and conductors connected to said anode and said cathode and extending through the top of said diving bell, and connected to a source of electrical power above the surface of the body of water wherein said diving bell is immersed.

5. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell on the outer surface thereof, a cathode secured to said diving bell on the inside of said diving bell, and conductors connected to said anode and said cathode electrically connected to a source of electrical power, said cathode being vertically spaced from the bottom edge of said container.

6. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell concentric with said diving bell on the outer surface thereof and insulated therefrom, a cathode secured to said diving bell on the inside of said diving bell, and conductors connected to said anode and said cathode electrically connected to a source of electrical power, said cathode being vertically spaced from the bottom edge of said container.

7. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell concentric with said diving bell on the outer surface thereof and insulated therefrom, a cathode secured to said diving bell on the inside of said diving bell, and conductors connected to said anode and said cathode electrically connected to a source of electrical power, said cathode being vertically spaced from the bottom edge of said container.

8. A pressure equalizing diving bell for submarine data recording at great depth comprising a hollow container open at its lower end, means for raising and lowering said container, an anode secured to said diving bell concentric with said diving bell on the outer surface thereof and insulated therefrom, a cathode secured to said diving bell on the inside of said diving bell, and conductors connected to said anode and said cathode and extending through the top of said diving bell and connected to a source of electrical power above the surface of the body of water wherein said diving bell is immersed, said cathode being vertically spaced from the bottom edge of said container.

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