

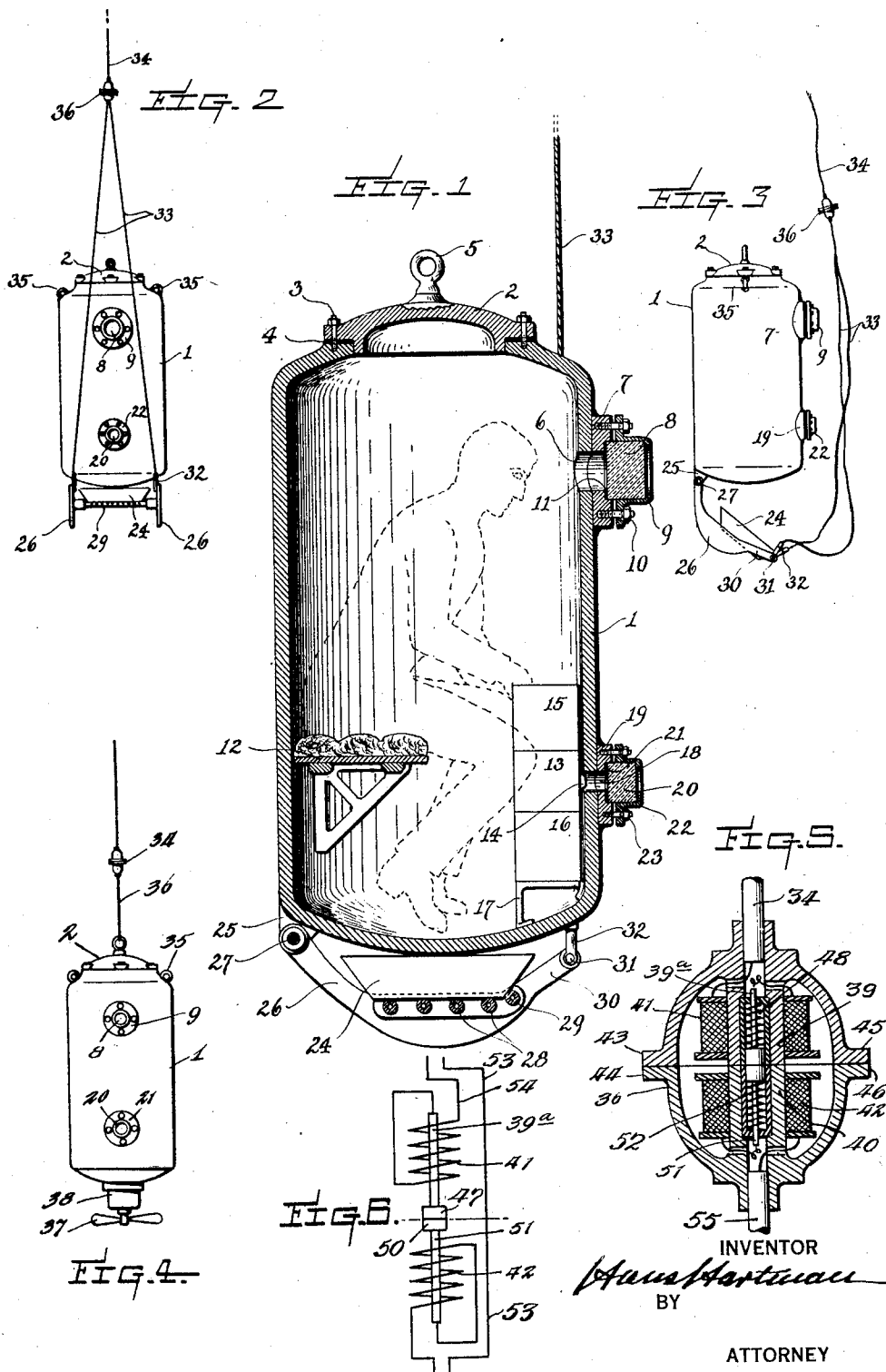
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SUBMARINE DRIVING AND EXPLORATION APPARATUS

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SUBMARINE DIVING AND EXPLORATION APPARATUS.

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The present invention relates to improvements in submarine diving and exploration apparatus and the main object in view is, to provide a deep sea diving chamber which will rise automatically to the water level by its own buoyancy in case the rope or cable breaks, from which it is suspended and lowered into the depth.

A further object of the invention is to provide means for dropping the cable from the chamber in the event of the breakage of the cable whereby the weight of the cable will not act to pull the chamber down or to hold it suspended below the surface of the water.

A still further object of the invention is to provide within the diving chamber photographic apparatus so arranged that the operator or observer can readily readjust the diaphragm and the focus of the same.

A preferred embodiment of the invention is illustrated in the accompanying drawings, wherein the same numerals designate the same parts in the different views.

Fig. 1 is a sectional side elevation of a diving chamber showing a weight to overcome its buoyancy arranged below the same;

Figs. 2 is a front elevation of Figure 1;

Fig. 3 is a side elevation of Figure 1, showing the weight sliding from its supports with the cable broken and free of tension;

Fig. 4 is a front elevation of a modified form wherein the weight is replaced by an electric motor and propeller which overcomes the buoyancy of the diving chamber;

Fig. 5 is a sectional view through the cable releasing device and

Fig. 6 a wiring diagram to show the electrical connection through Figure 5.

A suitable steel cylinder or shell 1, (forming a diving chamber) is hermetically closed at its top by means of a steel cover 2, held down by screw bolts and nuts as shown at 3 or in any other preferred manner. Between the cover 2 and the steel cylinder 1 is inserted a soft packing or ring 4 to better prevent the entrance of water into the interior of the chamber 1, and a steel ring or eyelet 5, attached to the center of the cover serves to fasten a cable or rope to the same as shown in Fig. 4.

6 denotes an observation opening, cut through the steel shell 1 which also passes through a steel ring 7, attached from outside to the cylinder so as to provide thereon a straight, (plane) seat for the glass disk 8 which is held tight against the ring 7 by

means of a bushing or frame 9, being attached to the ring 7 by screw bolts and nuts as shown at 10. A soft gasket or packing washer 11 is inserted between the glass disk 8 and the ring 7, to form better a watertight contact.

In the interior of the chamber 1 is provided a seat 12 for the operator or observer and a second opening, smaller in diameter, passes through the steel shell 1 in a vertical line below the afore described observation opening, as shown at 14, with a similar steel ring 19, against which the glass disk 20 is held by means of the bushing or flange 22, which is held in its place by screw bolts and nuts denoted 23. A soft gasket 21 is inserted between the glass disk 20 and the steel ring 19, which is also pierced by the opening 14 as shown at 18.

Numerals 13, 15 and 16 denote a motion picture camera of any preferred construction, whereby 13 may contain the film moving mechanism with a lens therein, facing the opening 14, 15 and 16 may represent the containers for the film rolls. It is obvious that this arrangement permits the observer, looking through the opening 6, to readily operate the said motion picture camera, either manually or by means of an electric motor, not shown, and also to re-adjust quickly the focus or diaphragm of the photographic apparatus placed in front of his seat and, being comparatively narrow, will occupy the space between his knees.

Below and outside of the diving chamber 1 is arranged a weight designated 24, resting upon a support 26, which is pivoted to the steel cylinder 1 as shown at 25 and 27. The support 26 consists of two curved levers between which are arranged horizontally rollers 28 upon which the weight 24 is normally resting. As this weight is conically shaped, it is prevented from moving forward by a roller 29, the same being slightly raised above rollers 28, as long as the support 26 is held in a horizontal position by means of the two cables 33, attached to the outer ends 30 of the support as shown at 31 and 32.

The cylinder 1 is so calculated and designed, that its weight including the weight of the operator and the camera and any other parts and apparatus taken into its interior, will not suffice entirely to overcome its buoyancy, due to the replacement of water, but that a certain, additional weight has to be added, to cause the cylinder to sink. If a cable 33, from which the chamber 1 is low-

ered into the water, is attached to the supports 26 as shown in Figs. 1 and 2, the cylinder itself, having a tendency to rise and representing alone and without the weight 24 no actual weight when entirely submerged, will rest upon the said weight 24 and the tension of the cable 33 will thus hold the supports 26 in a horizontal position, the weight 24 being arranged correctly in the center below the cylinder 1. The form (conical shape) of the weight and the slightly higher arranged roller 29 will prevent a displacement of the weight and no further means are required to hold the cable 33 or its continuation 34 against the steel cylinder 1.

As soon as however the cable 34 breaks, its tension between the vessel from which the diving apparatus is lowered into the water and the weight 24 will be eliminated and being pulled down by its own weight as well as by the weight 24, it will immediately slacken, the support 26, pivoted at 27 to the steel cylinder 1 will incline downward and the weight will slide off the rollers 28, 29 as shown in Figure 3, whereupon the steel chamber 1, being freed from the weight 24, which overcame its buoyancy, will now rise to the surface (level) of the water.

In Figure 4 is shown a modified form of a diving apparatus as described whereby the automatic weight release and the weight itself, which is necessary to overcome the buoyancy of the apparatus is replaced by a propeller 37, arranged with its shaft in a vertical position and being driven by an electric motor 38. As the weight of the driving apparatus can be so balanced, that for instance only a very slight additional weight of, from 25 to 50 pounds may be required to cause it to sink, the pull of the propeller in a downward direction will easily suffice when that much force is necessary. The cable 34, passing through the cable releasing apparatus denoted 36 and to be described later, may be an electric cable, that is to say it may contain electric conductors, sufficiently well insulated against each other by rubber, etc. and the electric current driving the motor and propeller may pass through said cable, being supplied from the vessel from which the diving apparatus is being lowered into the water. It is obvious that, as soon as this cable breaks, the said electric current will become interrupted and the motor and propeller will cease to operate and to exercise its downward pull and the diving chamber will immediately begin to rise to the surface by its buoyancy.

However in both constructions as described and illustrated still the danger remains that the weight of the cable from which the diving apparatus is suspended, may prevent the latter from rising to the surface. For instance the cable may break

at such a height above the diving chamber that its length, falling down towards the bottom of the water, will hang onto the diving cylinder and pull it down and hold it below the water. To overcome this danger, an apparatus is shown in Figure 5 which will drop the broken cable right above the diving apparatus when the cable breaks or the electric current passing through the same becomes interrupted.

This cable releasing device 36 consists mainly in two electro-magnets each being quite similar in shape and forming together an elongated iron shell or ball wherein two electro-magnets 39 and 40, having each electric windings 41, 42 are pointing with opposite poles towards each other being in direct contact with each other. Each shell 43 and 44 forms the second, but opposite poles of these two electro-magnets and both shells are perfectly fitting with their extending rims 45, 46 upon each other, but also the two inner, opposite poles 39, 40 fit exactly with their ends upon each other. Thus it is apparent that, when an electric current of sufficient power passes the two windings 41, 42, the two halves of the device, being with their opposite magnetic poles in direct, metallic contact, will attract each other and remain strongly connected as long as the electric current energizes the said electro-magnets. As soon as the cable breaks and the electric current ceases to flow, both electro-magnets will lose their attraction, fall apart and the weight of the broken cable will pull the upper half of the device away and the diving chamber, freed from the cable, will rise by its buoyancy to the level of the water.

The passage of the electric current through the device 36 may be arranged as follows: While one pole of the electric current may pass directly through the iron parts, like inner core and outer shell of this device, being grounded to the same and the entire diving apparatus, the second pole of the electric current enters the hollow interior of the upper core 39 and is in contact with a rod 39^a, arranged therein and insulated electrically from the hollow core. At its lower end this rod has a contact point 47 which is pressed downward by a coil spring 48 and contacts with a similar point 50, being attached to a similar contact rod 51, pressed upward by a similar coil spring 52, all arranged within the hollow center of the lower electro-magnet's core 40. Both electro-magnets are perfectly similar in their construction and size. Thus the electric current will pass from the upper insulated contact rod into the lower one and from there by means of a short electric cable, not shown in the drawing, into the electric motor 38 or, if so desired, also into the interior of the diving apparatus. It is obvious that in addition to this one pole con-

tact a plurality of such or similar contacts can be arranged within the space of the device 36 to serve a plurality of electric conductors, insulated electrically from each other, so as to serve for special and particular purposes, as for instance to provide a telephone connection from the diving chamber to the vessel from which it may be suspended, or the like, utilizing only a single electric cable, having a plurality of conductors, all of them insulated electrically from each other.

In Figure 6 is shown a wiring diagram to indicate how the electric current passes through the device 36. On conductor 53 is directly in electrical contact with the entire device 36 while the second conductor 54 leads to the contact rod 39^a, electrically insulated from the core 39 after passing the upper windings 41 and will then flow into the lower rod 51, through the lower windings 42 and into the electric propeller motor 38 or wherever it may be directed by means of another, short cable, as indicated at 55 in Fig. 5.

To prevent an untimely and undesired release of the electric cable through the electromagnetic device 36, the electric current passing through the windings of the same must never be interrupted while the cable is not broken. The windings must therefore be connected either in parallel to the electric motor 38, so as to hold magnetically the two parts of the device 36 together, when the current through the motor is interrupted by means of a switch by the operator inside the chamber or if connected in series with said motor as shown, the operator must in lieu of the motor bring some other suitable electric resistance into the circuit to keep the same closed, before breaking the circuit through the said motor, as otherwise, if no electric current passes through the windings of the device 36, the two parts of the same will separate and detach the cable from the diving apparatus. For instance an electrical heating apparatus may be installed inside the diving chamber, remaining all the time in circuit, so that always a sufficient amount of electric energy will flow thru the said windings of device 36 and energize the same and cause it to remain connected by magnetic attraction.

It is further obvious that a series of independent windings could be arranged around the two cores 39 and 40, each winding serving another electric circuit, if so desired, and all being connected at one end with each other and passing from their other ends through different short cables to their destination may it be the motor 38, a heating element inside the steel cylinder or illuminators arranged exteriorly of the same, not shown in the drawings and not forming an object of the present invention.

It is evident that, as long as sufficient elec-

tric energy passes thru the windings of the electro-magnets in the device 36, the same will remain mechanically one unit by magnetic attraction and that, should the cable 34, which contains the conductors for the electric energy supplied to the diving chamber 1 from the vessel from which it is suspended, break, the said electric energy will become immediately interrupted, the electro-magnetic attraction will disappear and both halves of the device 36 will fall freely apart and the diving chamber will not be prevented from rising to the water level by its inherent and predetermined buoyancy.

The same arrangement and device can be used to drop the cable near the diving chamber in the form as shown in Figures 1, 2 and 3 whereby for instance an electric current may pass through two conductors in the cable 34 from the vessel from which the apparatus is suspended and lowered into the water, through the windings of the two electro-magnets inside of the device 36 and thus hold both sections of the same together. As soon as the said cable breaks, this current will be interrupted and the device will separate and release the submerged apparatus 1 from the weight of the broken cable 34. It is also evident that in the structure as shown in Figs. 1, 2 and 3, from the device 36 may lead a short cable into the diving cylinder 1, to provide telephonic communication to the vessel above the water, to supply electric current for heating, illuminating, etc.

As this is not an object of the present application and not claimed, it has not been shown in the drawings.

While I have shown a preferred form and construction of a submarine apparatus with an automatic weight release and another preferred form in which the pull of the weight is replaced by the pull of an electrically driven propeller, it is obvious that both constructions can be carried out in different shapes, forms and with modified arrangements of the parts and I therefore do not wish to limit myself to the specific forms and structure as described and illustrated. I may, for example, prefer to substitute for a cylindrical chamber a globular form, the latter offering the best resistance against the pressure of water, but on the other hand also a larger area and inner space which cannot so well be entirely used. I may also add that the hermetically sealed in, operator or observer is breathing by means of a supply of oxygen carried inside the chamber in suitable steel containers and exhaling through a device which will absorb the carbon dioxide, that he may carry various instruments, like pressure and depth indicating gauges, scientific instruments for recording the temperature or other qualities of the water, for measuring the intensity of light penetration from above, etc. But as all these do not form a

part of the present application and are not claimed in the annexed claims, they have been omitted.

Having thus described my invention, what I claim as new is:

1. In combination with a submarine diving apparatus, a weight detachably arranged on the same, a cable for lowering the apparatus into the water and means to automatically release the said weight upon breaking of the cable.
2. In combination with a submarine diving apparatus, a weight attached detachably to the same, a cable from which the apparatus is suspended in water and means to automatically release the said weight and the said cable upon breaking of the cable.
3. In combination with a submarine diving apparatus, a cable for supporting said apparatus and automatic releasing means therefor operable to release said cable from said apparatus upon the breaking of the cable.
4. In combination with a submarine diving

apparatus, an electric cable and automatic releasing means operable to release said cable from said apparatus upon the breaking of the cable.

5. In combination with a submarine diving apparatus, an electric cable and electromagnetic means operable to release the said cable from the said apparatus upon breaking of the cable.

6. In combination with a submarine diving apparatus a cable for supporting said apparatus, submerging means to overcome the buoyancy of the apparatus and electric cable releasing means inserted into said cable by which the said apparatus is lowered into the water, said releasing means being operable to release the submerging means and the cable from the diving apparatus upon breaking of the cable.

Signed at New York city, in the county of New York and State of New York, this 20th day of May A. D. 1926.

HANS HARTMAN.

CERTIFICATE OF CORRECTION.

Patent No. 1,715,918.

Granted June 4, 1929, to

HANS HARTMAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 37, for the word "driving" read "diving"; page 3, line 15, for the word "On" read "One"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of July, A. D. 1929.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.