

B. REINIER.
 APPARATUS FOR RAISING SUBMERGED SHIPS AND OTHER BODIES.
 APPLICATION FILED MAR. 27, 1907.

934,838.

Patented Sept. 21, 1909.
 2 SHEETS—SHEET 1.

Fig. 1.

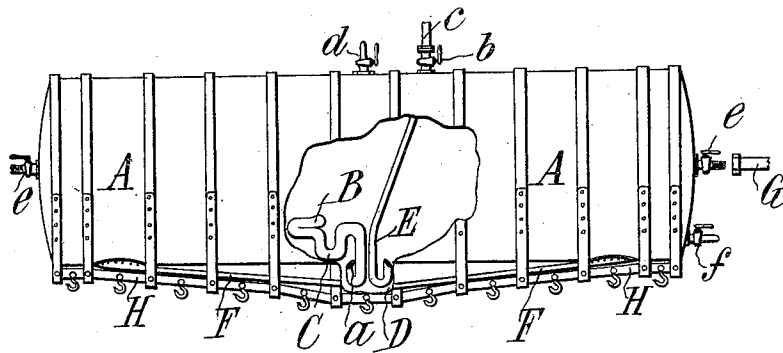
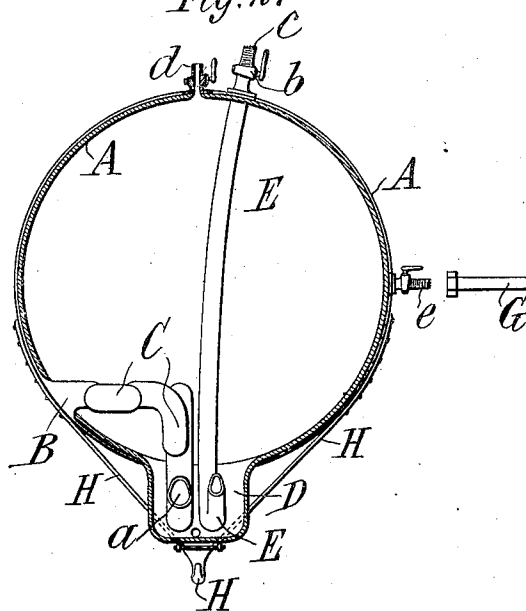


Fig. 2.



WITNESSES:

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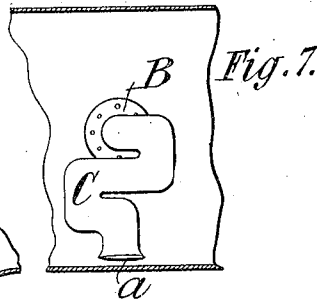
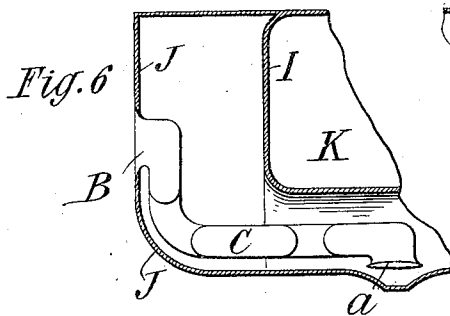
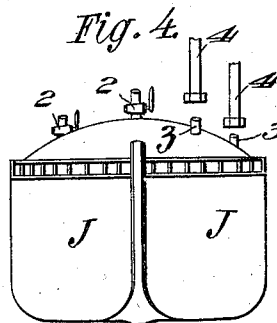
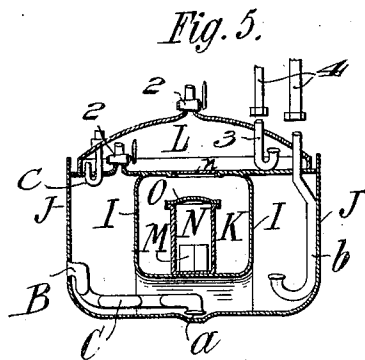
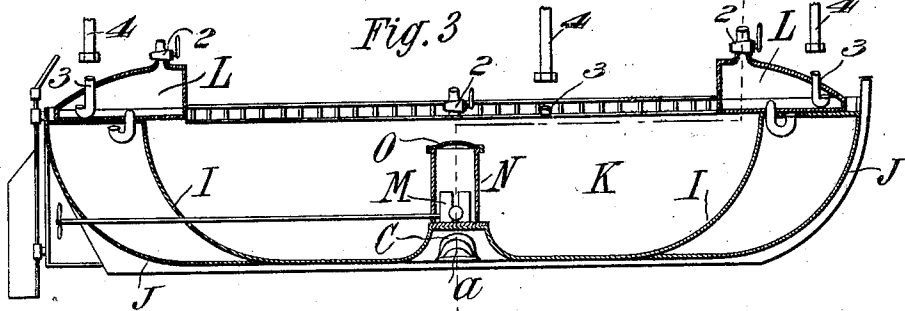
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 By *his Attorneys*
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UNITED STATES PATENT OFFICE.

BENJAMIN REINIER, OF VIDAUBAN, FRANCE.

APPARATUS FOR RAISING SUBMERGED SHIPS AND OTHER BODIES.

934,838.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed March 27, 1907. Serial No. 364,859.

To all whom it may concern:

Be it known that I, BENJAMIN REINIER, a citizen of the Republic of France, residing in Vidauban, Var, France, have invented certain new and useful Improvements in Apparatus for Raising Submerged Ships and other Bodies, of which the following is a specification.

The invention provides a body, which is adapted to be submerged and inflated for the purpose of buoying or lifting sunken ships and various other analogous purposes, as will be hereinafter described in detail.

The body constituting the invention is preferably in the form of an incompressible caisson of regular cylindrical shape, or it may be slightly enlarged at its middle. This cylinder is provided at its middle part with a large opening which places it in constant communication with the water when the cylinder or caisson is immersed in the water.

A tubular water trap, which in this description will be called a siphon, is placed in the caisson and in communication with the said opening; it is not properly speaking a siphon composed of two branches pointing downward, but it is the apparatus well known by this name in the marine service and having a tube which, in each watertight compartment of a ship and particularly in torpedo boats, extends from the deck to the keel and serves to discharge the water contained in the latter by means of a system of valve pumps. This siphon caisson, the siphon of which is single or multiple according to circumstances, will be fully understood, as well as its use, by the following description with reference to the accompanying drawings.

Figure 1 is an elevation of the caisson with a part broken away to show the siphon. Fig. 2 is a cross-section of the caisson, drawn to a larger scale. Fig. 3 is a longitudinal section of an apparatus with double walls, called a submarine lift, thus forming a caisson. Fig. 4 is an end view of the said caisson. Fig. 5 is a cross-section of the said caisson on the lines 1, 1 and 2, 2 of Fig. 3. Figs. 6 and 7 are detail views of the siphon drawn to a larger scale.

The apparatus is constructed of a metal cylinder A which, arranged horizontally, is provided at its lower middle part with a large opening B for the admission of water. This opening B communicates with the siphon C having a number of bends, and

ends at *a* in the lower vessel D. This lower vessel D, which projects below the cylinder A, is closed at the bottom by a stop-plate like a man-hole cover; this plate is kept closed during operations and is only opened for cleaning purposes and repairs. Into the vessel D extends a second siphon E which communicates with the force pump by a tube *c* at the end of which is a cock *b*.

At the upper part of the caisson A is a cock *d* which, when required, controls the outlet of the air contained in the caisson, so as to give place to the water entering through the opening B. Besides the siphon tubes C and E, if the apparatus is to be inclined it is also provided with two supplementary emptying pipes F for facilitating the discharge of the water, which can thus pass directly from one of the ends of the apparatus into the vessel D, and thus reach the mouth *a* of the discharge siphon. At the two ends of the cylinder A are arranged cocks *e* on which can be screwed, when required, the pipe connections G serving to place a number of apparatus in communication for combined and collective action. The cylinder or caisson A is also provided at the lower part of one of its ends, with a cock *f* which allows, at the commencement of the operation, of immersing the apparatus so that the level of the water in the interior comes immediately above the water inlet B. A mooring strap is placed at H.

The caisson apparatus is used in the following manner:—All the cocks being closed, the cylinder A is placed on the water, with the mooring strap H downward,—that is to say, in the water. The cock *d* is thus at the top of the apparatus, and the tube *c* of the air pump is screwed on the cock *b* and this cock and the air cock *d* are opened. The apparatus, which was floating, then commences to sink slowly because of its weight, and of the admission of water through the opening B. Just as the cylinder is on the point of disappearing, the cock *d* is closed. When the cylinder is immersed, the divers commence to connect it to the sunken body. The water is then driven out of the cylinder A by means of the air forced in by the pump through the tube *c* and the siphon E. The interior of the apparatus being always in communication with the surrounding water through the hole B of the siphon C, the wall of the cylinder is between two opposite and nearly

equal pressures, and it will therefore not suffer any deformation, however slight may be its thickness. The upper part of the wall A supports a pressure equivalent to the difference between that of the air inside and the water outside,—that is to say, to the pressure exerted by a column of water of the height of the diameter of the cylinder A. Similarly, owing to the siphons C extending to the opening B, the water forming an obstruction prevents the exit of the air and consequently the introduction of water into the interior of the cylinder when the cock *d* is closed. If the apparatus should be inclined in one direction or another, any water which might be at one of the ends will pass into the pipes F and into the vessel D and enter the siphon C through the mouth *a* and pass out through the opening B. In this manner, in whatever position the apparatus may be, directly the cock *d* is closed it cannot fill with water and sink during the refloating. Under these conditions, when the volume of air forced into the cylinder is such that the ascending power of the immersed apparatus is greater than its total weight and that of the submerged body, the cylinder and this submerged body will rise to the surface. The caisson is thus absolutely buoyant in any depth of water, on account of the equilibrium of pressures. This system of water trap, or so-called siphon, can be put to many different uses some of which are hereinafter described as examples. This refloating apparatus is illustrated in Figs. 3 to 7, for example, as having a receptacle forming part thereof, capable of receiving a load of articles to be salvaged; the lift is of the form of a flat boat, such as a cargo boat, the contour of the bottom of which is rounded and not sharp or angular.

The part of the lift which constitutes the refloating body consists of a kind of caisson the inner wall I of which is a water-tight partition curving to a point of junction at the bottom with the outside wall J, and closed at top and bottom by parallel walls. Thus arranged the refloating body will have in the middle of the boat a free space accessible through any suitable openings or hatches (not shown) and in which will be arranged the chamber K the side walls of which are formed of a partition I. The lift is provided with two independent so-called compensation chambers L. These two chambers are really refloating caissons with siphons and the shape of which is suitable to the bow and stern of the boat. At the upper part of the apparatus are the air cocks 2 and the air pipes 3 adapted for connection with pipes 4 coming from a refloating pump located on the surface of the water, and which pipes 3 extend to the lower part of the compensation chambers L. At the lower

part of the chambers L and of the boat respectively are arranged siphons with outer openings which insure constant communication between the interior of the chambers L and of the boat respectively with the exterior. The working of this submarine siphon lift is identical with that previously explained in submersion and refloating; when once the apparatus is submerged, the divers can load the articles to be salvaged in the chamber K and then proceed with the refloating. If during the operation the lift should by tilting either forward or backward, tend to overbalance, the equilibrium can be restored by emptying one or other of the compensating chambers L. When the lift comes to the surface of the water it can either be towed, or be self propelled by a motor M which can be placed in the chamber K or in a metal case N closed practically airtight by a removable cover *n* to protect it from the water. This casing N must be strong enough to support the greatest pressures that it will meet with in the water, for it must not have an opening anywhere (except when the cover *n* is removed) in order that the equilibrium of the pressures may be insured. This casing is, however, provided at the top with a large opening O which can be closed when required by an air-tight cover. It will be seen that such lift is essentially similar to the siphon caisson hereinbefore described, both in construction and manner of operation.

What I claim is:—

1. A body adapted to be submerged and rendered buoyant by inflation, having in its interior a tube bent to form a water trap, said trap having a free opening from the inside to the outside of the caisson, so that the interior shall always be in communication with the water in which the body is submerged.

2. A caisson for refloating sunken ships and similar purposes having in its interior a tube bent to form a water trap, said trap having a free opening from the inside to the outside of the caisson, so that the interior shall always be in communication with the water in which the caisson is submerged, said caisson being submersible and incompressible in all positions which it may occupy upon the water or under the water at any depth.

3. A caisson for refloating sunken ships and similar purposes having a tube bent to form a water trap and having a free opening from the inside to the outside, said caisson having also an interior chamber D, a siphon E extending into the same and having a valved tube *c* for connecting it with an air force-pump, said caisson having also a cock *d* for regulating the discharge of air when water enters through said trap.

4. A caisson for refloating sunken ships

or similar purposes having in its interior a tube bent to form a water trap and having a free opening from the inside to the outside, said caisson having also a chamber D in which the inner end of the trap lies, and discharge tubes F leading from the ends of the casing into the chamber D for feeding the discharge trap.

5. A caisson for refloating sunken ships and similar purposes having a double wall forming a hollow jacket which can be filled with water for submerging the caisson, and into which air may be forced for raising it, the center having a removable cover and being available for carrying goods.

6. A caisson for refloating sunken ships and similar purposes having a double wall forming a hollow jacket which can be filled with water for submerging the caisson and into which air may be forced for raising it, said jacket having independent chambers whereby the equilibrium of the caisson may be restored in case it should tilt.

In witness whereof I have hereunto signed my name this 14 day of March 1907, in the presence of two subscribing witnesses.

BENJAMIN REINIER.

Witnesses:

ALEXIS GARARD,

ANTONIOTTO PARTMELTO.