K. WHITING.

SUBMARINE CRAFT.

APPLICATION FILED JAN. 4, 1913.

1,097,700. Patented May 26, 1914.

Fig. 1,

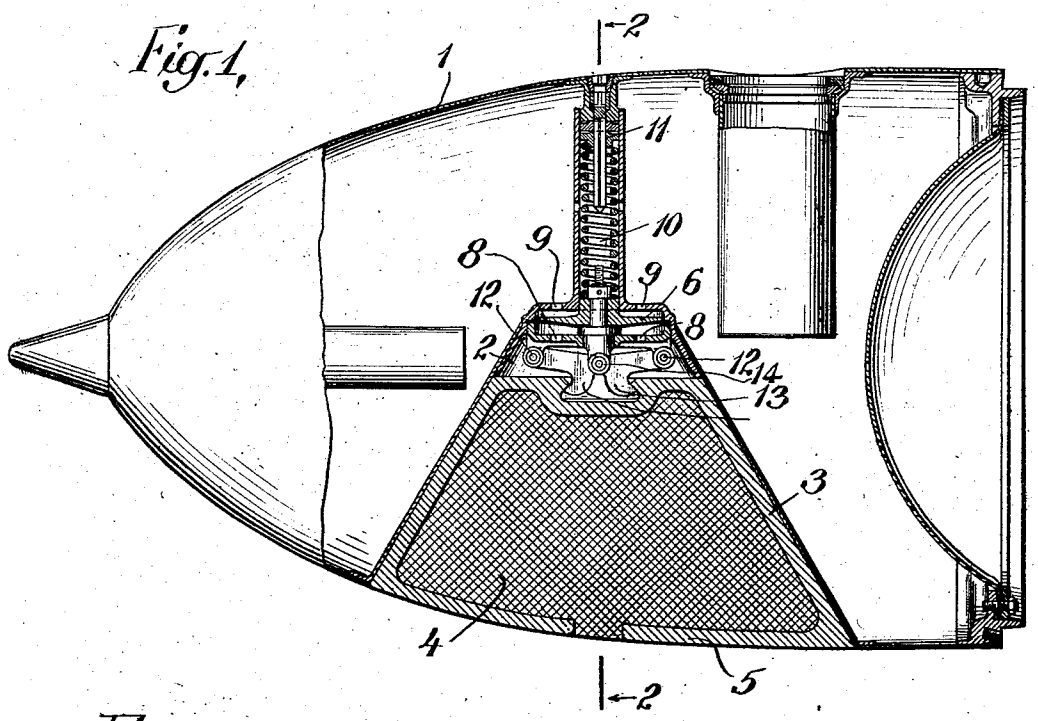
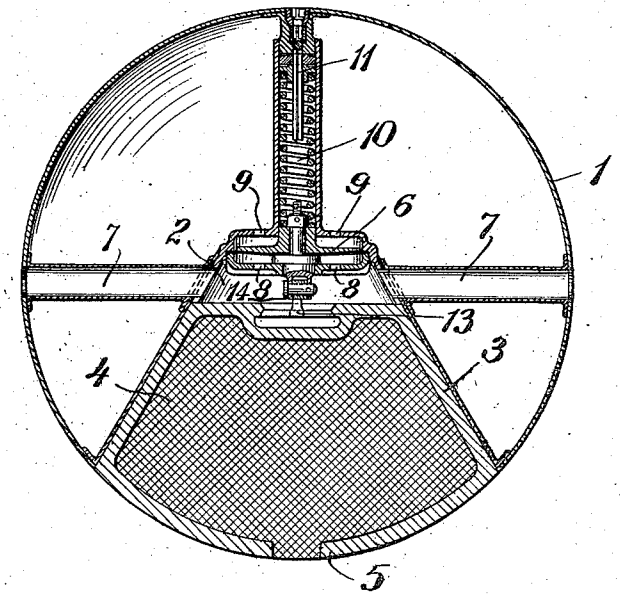


Fig. 2,



WITNESSES

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SUBMARINE CRAFT.

1,097,700. Specification of Letters Patent. Patented May 26, 1914.

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To all whom it may concern:

Be it known that I, KENNETH WHITING, a citizen of the United States, residing at and whose post-office address is Larchmont, county of Westchester, and State of New York, have invented certain new and useful Improvements in Submarine Craft; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to mechanism effective to automatically cause a water-tight submarine craft to rise to the surface of the water after it sinks to a predetermined depth, and more specifically to such mechanism wherein a mass of material of higher specific gravity than the water in which the craft is designed to operate, and of suitable volume, is automatically released from the craft by supporting mechanism on which the hydrostatic pressure of submergence acts directly, so that the tendency of the supporting mechanism is gradually overcome as the craft sinks, and the mass instantly released at the predetermined depth.

A typical application of my improved apparatus is in connection with practice submarine torpedoes. In such torpedoes the depth regulating apparatus sometimes fails and allows the torpedo to sink, or a similar action results from other causes, whereupon the torpedo is lost. This difficulty has previously been recognized and apparatus has been devised for effecting the recovery of the torpedo, but the apparatus previously disclosed for this purpose has several practical disadvantages.

In accordance with my present invention, the mass of material, preferably metal, is disengageably held by supporting mechanism which is exposed on one side to the interior of the torpedo, and on the other side to the hydrostatic pressure of submergence as a result of a conduit leading from the surrounding water, so that the means tending to hold the mass is gradually overcome as the torpedo sinks, and finally releases the mass when the predetermined depth is reached, whereupon the remaining torpedo structure rises to the surface of the water, since it is designed to be lighter than the water displaced. By this construction, the whole disengageable mass is instantly released by means of mechanism which is acted upon directly by the surrounding water, so that the action of the releasing mechanism is not dependent upon the action of any intermediate apparatus. Furthermore, the exposed surface of the disengageable mass is shaped so as to conform with the lines of the hull of the craft, thereby presenting an uninterrupted contact surface to the water when the craft is in normal operation.

In the accompanying drawings, illustrating the preferred form of my apparatus applied to a submarine torpedo, for example, of which the detachable head only is shown: Figure 1 represents a side elevation partly in section, of the head of such a torpedo, adapted to be fitted to the remaining part of the torpedo to form a complete device; and Fig. 2 represents a cross section on line 2—2 of Fig. 1.

The torpedo is provided with a hull 1 of metal designed to withstand the hydrostatic pressure of submergence at the greatest depth to which the torpedo is intended to sink, and to remain sealed against the entrance of water at all times. The hull is provided with an inwardly converging pocket 2 into which fits a detachable mass comprising a cast iron frame 3 shaped so as to closely fit within the pocket, and a block 4 of lead embraced by the frame, the exposed surface 5 of the mass being shaped to conform with the lines of the hull so as to present an uninterrupted contact surface to the water, as shown. The mass is located so as to give the proper trim to the torpedo when associated with it, and to cause the torpedo to point upward when released from it. Furthermore, the total weight of the torpedo in normal operation is preferably slightly greater than the water displaced by it when submerged, but the detachable mass has such weight that when released, the remaining torpedo structure is of less weight than the water displaced, and therefore rises to the surface.

The supporting mechanism for disengageably holding the mass in place in the pocket 2 will now be described.

It is well understood that the hydrostatic pressure of submergence in water in which torpedoes of this kind are usually designed to operate, amounts to approximately one-

half pound per square inch for each foot of depth. The flexible diaphragm 6 is exposed one side to the pressure within the torpedo head, usually atmospheric pressure, and is exposed on the other side to the hydrostatic pressure of submergence, so that for each foot of depth there is an upward pressure on the diaphragm amounting to approximately one half-pound per square inch for each foot of depth. This hydrostatic pressure is brought to bear upon the diaphragm by means of the conduits 7 leading directly from the sides of the torpedo, and the openings 8 in the wall of the chamber containing the diaphragm, while the pressure within the torpedo acts upon the other side of the diaphragm, as a result of the openings 9 in the opposite wall of this chamber, the flexible outer part of the diaphragm forming a water-tight joint with these walls so as to effectively seal the inside of the torpedo at this place against the entrance of water. The spring 10 is compressed against the upper side of the diaphragm 6 by a sliding cap 11, which may be adjusted in position by a screw to regulate the stress of the spring effective on the diaphragm and thereby the maximum depth to which the torpedo is allowed to sink. The lower wall of the diaphragm chamber is also provided with lugs 12 to which the latches 13 are pivoted, while the diaphragm 6 carries a lug 14 pivotally connected to these latches. The arrangement is such that when the supporting mechanism has the position shown in the drawings, the toes of the latches engage coöperating projections on the frame 3 and hold the mass in position in the pocket, so that not only does the spring 10 tend to hold the diaphragm in that position, but the detachable mass also acts in the same direction by the amount of its weight, the hydrostatic pressure on the detachable mass being almost exactly balanced. However, when the hydrostatic pressure of submergence acting on the under side of the diaphragm 6 exceeds the combined effects of the spring 7 and the detachable mass, the diaphragm will be flexed upwardly to the position at which the toes of the latches 13 become disengaged from the projections of the embracing frame 3, whereupon the detachable mass will be instantly released. The weight of the remaining torpedo structure being less than that of the water displaced, the torpedo will then rise to the surface of the water and float with its head sticking up, so that the torpedo may be easily seen and readily recovered. Another detachable mass may then be substituted for the one released and the torpedo is again ready for operation as before.

By extending the conduits 7 to the sides of the torpedo, the hydrostatic pressure of submergence acts on the diaphragm, without the conjunctive action of any head pressure when the torpedo is moving through the water. Also, by this arrangement, the speed of the torpedo is not interfered with. Furthermore, by the arrangement described, the spring 10 may be smaller than would otherwise be required, as a result of the assisting action of the detachable mass tending to hold the diaphragm against the hydrostatic pressure of submergence.

Although I have described my improved apparatus in connection with a practice submarine torpedo, it is to be understood that my invention is not limited to this application, or to the details of construction hereinbefore described, but that I intend to cover the combination of the improvements with all submarine craft to which they are applicable and to cover all forms of construction within the broad interpretation of my claims.

Having thus described my invention, what I claim is:—

1. The combination with a water-tight sub-marine craft; of mechanism normally carried by the craft comprising a releasable mass of higher specific gravity than the water in which the craft is designed to operate; a supporting mechanism normally holding the mass in place; and a conduit leading from the water directly to the supporting mechanism to make the hydrostatic pressure of submergence effective directly against one side of the supporting mechanism so as to gradually overcome its supporting tendency as the craft sinks and to release the mass at the predetermined depth; the arrangement being such that the submerged craft is lighter than the water displaced by it when the mass is released from it; substantially as described.

2. The combination with a water-tight submarine craft; of mechanism normally carried by the craft comprising a releasable mass of higher specific gravity than the water in which the craft is designed to operate; and supporting mechanism normally holding the mass in place in the torpedo structure comprising a flexible diaphragm, a conduit leading from the water to one side of the diaphragm so that the hydrostatic pressure of submergence acts on the diaphragm, and a spring acting on the diaphragm against the hydrostatic pressure, said mass being disengageably connected to said diaphragm and assisting said spring to oppose the hydrostatic pressure; the arrangement being such that the submerged craft is lighter than the water displaced by it when the mass is released from it; substantially as described.

3. The combination with a water-tight submarine craft having an inwardly converging pocket closed to the interior of the craft; mechanism normally carried by the craft, comprising a detachable mass of metal

having an embracing frame closely fitting within the pocket with its exposed surface conforming with the lines of the hull so as to present an uninterrupted contact surface to the water; a supporting mechanism normally engaging the supporting frame to hold the mass in place in the pocket; and automatic releasing mechanism acted upon directly by the surrounding water and effective to release the mass at a predetermined depth of submergence; the arrangement being such that the submerged craft is lighter than the water displaced by it when the mass is released from it; substantially as described.

4. The combination with a water-tight submarine craft; of mechanism normally carried by the craft, comprising a releasable mass of higher specific gravity than the water in which the craft is designed to operate; and supporting mechanism normally holding it in place in the torpedo structure, comprising a flexible diaphragm, a conduit leading from the water to one side of the diaphragm so that the hydrostatic pressure of submergence acts on the diaphragm, means acting on the diaphragm against the hydrostatic pressure, and a latch adapted to engage the mass when said means overcome the hydrostatic pressure and to disengage the mass when the hydrostatic pressure overcomes said means; the arrangement being such that the submerged craft is lighter than the water displaced by it when the mass is released from it; substantially as described.

5. The combination with a water-tight submarine craft having an inwardly converging pocket in its hull closed to the interior of the craft; of mechanism normally carried by the craft, comprising a detachable mass of metal of higher specific gravity than the water in which the craft is designed to operate; and supporting mechanism normally holding the mass in place in the pocket, comprising a flexible diaphragm, a spring acting on one side of the diaphragm, a conduit leading from the water to the other side of the diaphragm, and a latch adapted to engage the mass when the diaphragm is held against the hydrostatic pressure, and to disengage the mass when the hydrostatic pressure moves the diaphragm sufficiently against the action of the spring; the arrangement being such that the submerged craft is lighter than the water displaced by it when the mass is released from it; substantially as described.

6. The combination with a water-tight submarine craft; of mechanism normally carried by the craft, comprising a detachable mass of material of higher specific gravity than the water in which the craft is designed to operate; and supporting mechanism normally holding the mass in place, comprising a flexible diaphragm, a spring acting on one side of the diaphragm, a conduit leading from the water to one side of the diaphragm, and a latch supported from the diaphragm and engaging the mass when the diaphragm is held by the spring and the mass against the hydrostatic pressure of sugmergence and to disengage the mass when the hydrostatic pressure moves the diaphragm sufficiently against the action of the spring and the mass; the arrangement being such that the submerged craft is lighter than the water displaced by it when the mass is released from it; substantially as described.

7. The combination, with a submarine torpedo, having an inwardly converging pocket in its hull closed to the interior of the torpedo; of mechanism normally carried by the torpedo, comprising a detachable mass of metal closely fitting in said pocket and having its exposed surface conforming with the lines of the hull so as to present an uninterrupted contact surface to the surrounding water; and supporting mechanism normally holding the mass in place in the pocket, comprising a flexible diaphragm, open on one side to the pressure within the torpedo and a spring acting on one side of the diaphragm, conduits leading from the water at the sides of the torpedo to the other side of the diaphragm, and a latch adapted to engage the mass when the diaphragm is held against the hydrostatic pressure and to release the mass when the hydrostatic pressure moves diaphragm sufficiently against the action of the spring; the arrangement being such that the submerged torpedo is lighter than the water displaced by it when the mass is released from it; substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

KENNETH WHITING.

Witnesses:
EDNA M. WHITING,
R. L. BINGHAM.