M. A. LAUBEUF.

DEVICE FOR RAISING SUBMARINE VESSELS.

APPLICATION FILED JUNE 3, 1909.

955,414. Patented Apr. 19, 1910.

Fig. 1.

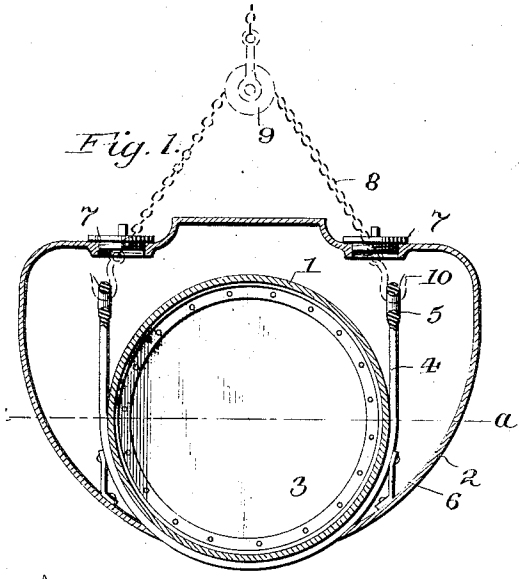
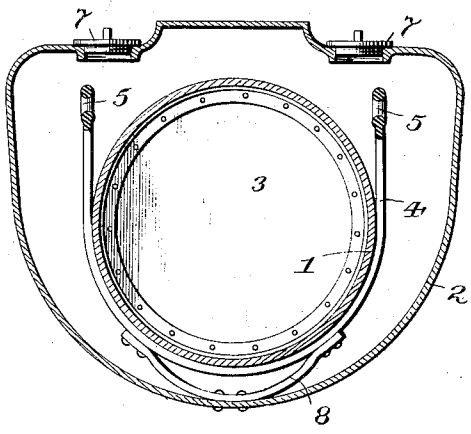


Fig. 2.



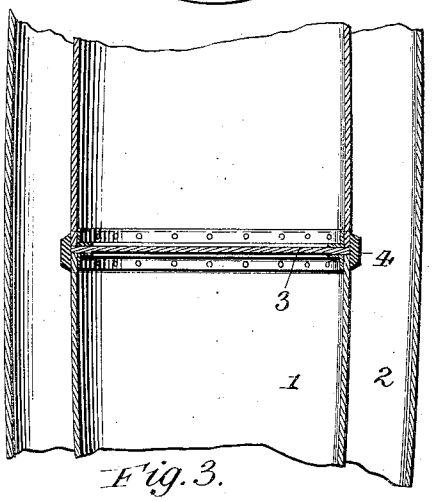


Fig. 3.

Fig. 4.

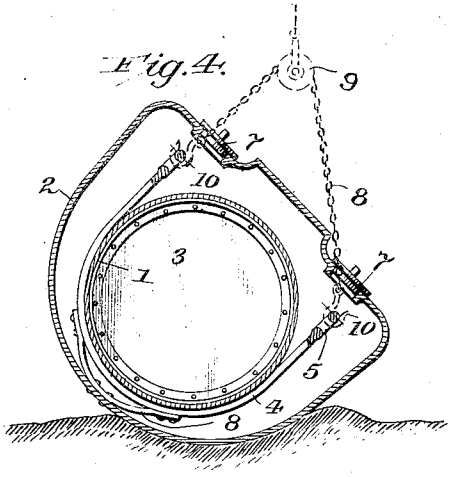
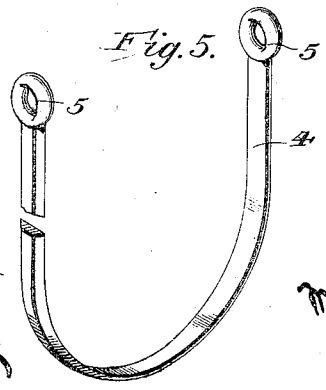


Fig. 5.



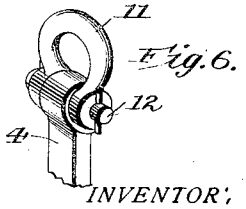


Fig. 6.

WITNESSES

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DEVICE FOR RAISING SUBMARINE VESSELS.

955,414. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed June 3, 1909. Serial No. 499,943.

To all whom it may concern:

Be it known that I, MAXIME ALFRED LAUBEUF, a citizen of the Republic of France, residing at Paris, in the Department of the Seine, France, have invented certain new and useful Improvements in Devices for Raising Submarine Vessels, of which the following is a specification.

My present invention relates to devices for raising submarine vessels, and the particular object of the invention is the supplying of means upon the submarine for the attachment of chains or other hoisting connections, and to distribute the stresses due to such lifting in such a manner as not to strain or otherwise damage the hull of the submarine.

The system is applicable to submarines having a partial double hull and to those having a complete double hull, and particularly to boats constructed under French Patent No. 390,560, granted to me July 31, 1907. Such boats are likely to sink to the bottom in the event of some portion of their mechanism becoming inoperative, and they are then helpless. It has long been recognized that some means must be provided for attaching hoisting chains to such boats to enable them to be lifted to the surface in the event of such an accident, and it has often been proposed to rivet or otherwise fasten to the exterior of the hull a series of eyes or rings for this purpose. This arrangement is objectionable first, because such rings are liable to become damaged in the ordinary handling of the boat, tend to reduce the speed, and because of the stresses brought upon the rivets and their consequent loosening are apt to cause leaks of a serious nature in the hull of a boat.

To the elimination of these defects, and the securing of certain additional advantages, my invention consists in certain constructions and combinations of parts which will now be described and which are illustrated in the accompanying drawings, wherein—

Figure 1, is a transverse sectional elevation of a submarine vessel having a partial double hull and showing my device as applied thereto; Fig. 2, is a transverse sectional elevation of a submarine having a complete double hull and having my invention applied thereto; Fig. 3, is a longitudinal section showing the location of a bulkhead in the inner hull and the relative position of certain parts of my device, taken on line *a*—*a* of Fig. 1; Fig. 4, is a transverse sectional elevation of a submarine vessel as it rests upon the bottom, designed to illustrate certain advantages of my mechanism; Fig. 5, is a perspective view of a sling forming a part of my invention; and Fig. 6, is a detailed view of a modified construction of the eye of the sling shown in Fig. 5.

Referring now to Figs. 1 and 3, 1 is the inner hull of the submarine, and 2 is the outer hull thereof. The space between these two hulls is entirely or partly filled with water. The inner hull is attached to the outer hull in any suitable manner, these details not being shown in the drawings as they form no part of my present invention. The inner hull may be divided into sections by a bulkhead 3, or a series of bulkheads, which are attached to the shell, 1, by angles or in any other suitable manner. These bulkheads are primarily for the purpose of giving strength to the inner hull of the submarine. They might be provided with openings to permit the passage of the crew, or otherwise modified, as the conditions require.

Within the outer hull, and closely encircling the inner hull, is a series of slings or bands 4, whose ends terminate in loops or eyes 5. These loops are in no way attached to the inner hull, but are so formed as to hug it closely throughout the lower half of its circumference, and are held in place by brackets 6, riveted to the slings and to the outer shell 2. As shown in Fig. 1, they pass outside the outer shell at the bottom of the boat, and in order to prevent them from causing undue resistance to the progress of the boat they are given trapezoidal cross section in order that such resistance may be a minimum. This section is illustrated in Figs. 3 and 5. It might be modified in various ways to secure the same end, as for instance by the use of a half round section.

Directly above the eyes 5 openings are formed in the outer hull 2, provided with covers 7. These openings are suitably located for the passage of a chain 8 which is preferably passed over a block 9 to equalize the stress on the two sides of the slings. It will be seen by an inspection of Fig. 3 that

the slings 4 are located at the bulkheads 3 so that these bulkheads may receive whatever compressive stress is exerted by the slings. The size and number of the slings 4 may be determined by the weight of the boat to be lifted, and should be sufficient to support that entire weight without the aid of the buoyant effect of the water. It is desirable that the slings should be made wide so as to bear over as large a surface as possible, thus evenly distributing their load. The preferred form is illustrated in Fig. 5. A modified form of eye is illustrated in Fig. 6, and consists merely of a loop 11 attached to the slings 4 by a pin 12.

Referring now to Fig. 2, it will be noted that the essential difference when the device is applied to a submarine having a complete double hull is that the slings 4 now remain entirely within the outer hull, but here, as in the previous case, the slings 4 are not attached to the inner hull 1, but are fastened to the outer hull 2 by brackets 8 differing somewhat in form from the brackets 6 of the previous case. The form, however, of these brackets is not essential and any shape of bracket that will give the desired support to the slings 4 may be used.

Covers 7 for closing the openings in the outer hull may be screwed in place or otherwise held in any other desired manner. In the case of most boats an ordinary manhole and cover could be used.

The method of using the device will be discussed with reference to Fig. 4. A diver would first remove covers 7 and would then attach the hooks 10 to the eyes 5. The hooks 10 are attached to the opposite ends of a short chain 8 which passes over a pulley 9, carried on the end of the hoisting chain. Similar chains having been attached to each set of slings the boat would then be hoisted to the surface through the action of windlass or other hoisting means, carried on a vessel at the surface. It will be noted that due to the action of the pulley 9, the stress on the two ends of the slings would be practically equalized and the boat would probably assume an upright position when lifted clear of the bottom. The slings 4 transmit their stress directly to the inner hull of the boat there being no tendency to loosen rivets in such inner hull. The rivets attaching the brackets 6 (or 8) to the outer hull would probably not be stressed, but even if they were so stressed to the point of loosening, the leakage caused thereby could have no harmful effect, on the inner hull. In this manner I am enabled to avoid the bringing of excessive localized stresses on the watertight hull of the submarine boat. The attaching means are entirely within the outer hull where they are safe from injury and where they cause no hindrance to the speed of the vessel. They are always readily accessible for inspection or repair.

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

1. In combination with a submarine vessel having an inner and an outer hull, a series of slings adapted to support the inner hull and connected to the outer hull; and openings through the outer hull for the passage of hoisting connections.

2. In combination with a submarine vessel having an inner and a partial outer hull, a series of slings adapted to support the inner hull and connected to the outer hull; and openings through the outer hull for the passage of hoisting connections.

3. In combination with a submarine vessel having an inner hull provided with bulkheads, and an outer hull; slings adapted to support the inner hull and connected to said outer hull; and openings in the outer hull for the passage of hoisting connections, said slings being located near said bulkheads.

4. In combination with a submarine vessel having an inner hull provided with bulkheads, and a partial outer hull; slings adapted to support the inner hull and connected to said outer hull; and openings in the outer hull for the passage of hoisting connections, said slings being located near said bulkheads.

5. In combination with a submarine vessel having an inner hull and an outer hull; a sling adapted to support the inner hull and connected to the outer hull; and openings through the outer hull for the passage of hoisting connections.

6. In combination with a submarine vessel having an inner hull and a partial outer hull; a sling adapted to support the inner hull and connected to the outer hull; and openings through the outer hull for the passage of hoisting connections.

7. In combination with a submarine vessel having an inner hull and an outer hull; slings attached to the interior of said outer hull and passing beneath the inner hull; and openings in said outer hull for the passage of hoisting connections.

8. In combination with a submarine vessel having an inner hull and a partial outer hull; slings attached to the interior of said outer hull and passing beneath the inner hull; and openings in said outer hull for the passage of hoisting connections.

9. In combination with a submarine vessel having an inner and outer hull; a series of slings bearing against the inner hull, the ends of the slings terminating adjacent to openings formed in the outer hull.

10. In combination with a submarine vessel having an inner and outer hull; a series of slings bearing against the inner hull but

wholly disconnected therefrom, the ends of the slings terminating adjacent to openings formed in the outer hull.

11. In combination with a submarine vessel having an inner hull and an outer hull; a bulk-head in the inner hull; and a sling passing about the inner hull in plane with the bulk-head.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

MAXIME ALFRED LAUBEUF.

Witnesses:
CHAS. H. WHITING,
H. C. COXE.