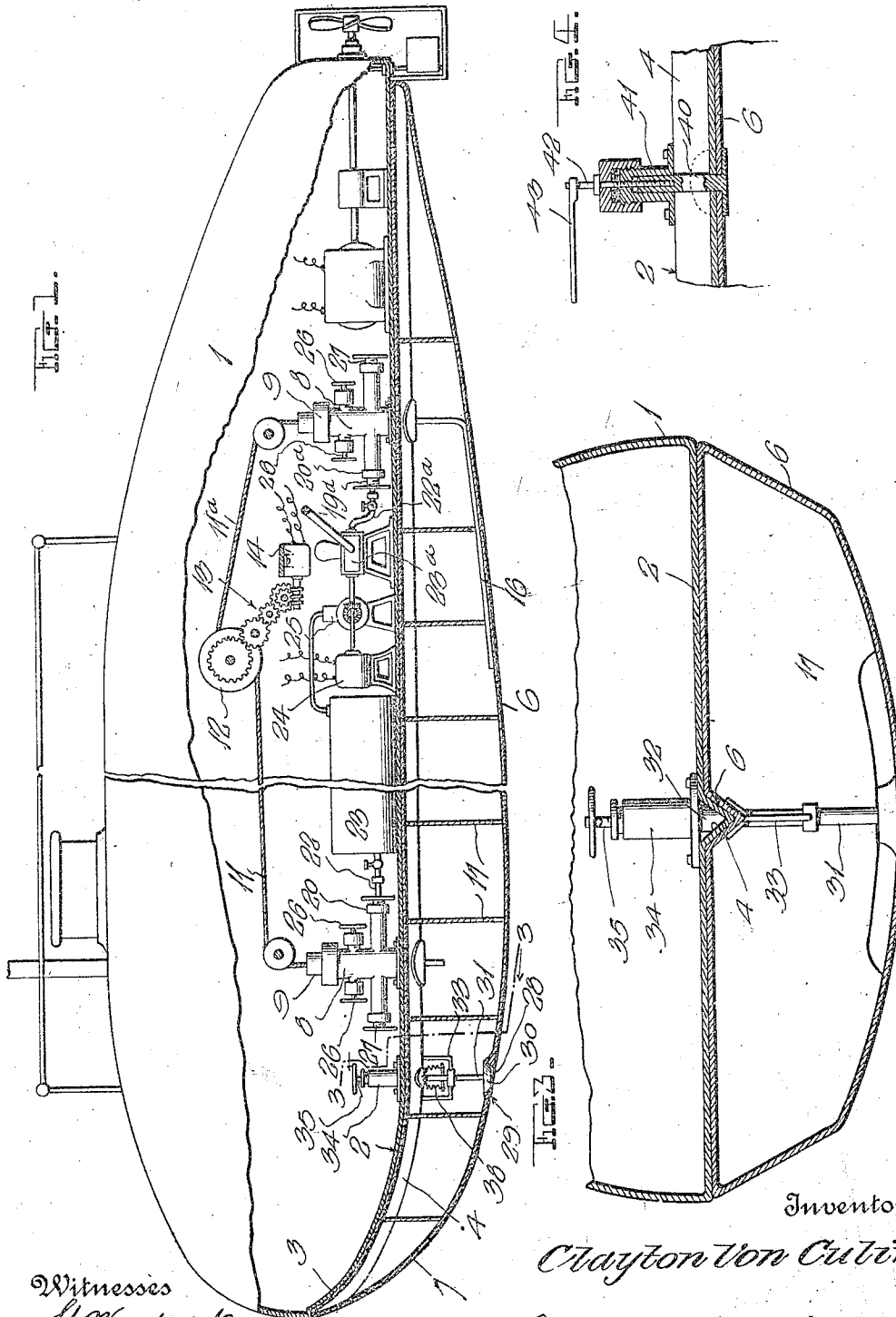


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SUBMARINE VESSEL.
APPLICATION FILED OCT. 18, 1915.

1,175,848.

Patented Mar. 14, 1916.

2 SHEETS—SHEET 1.



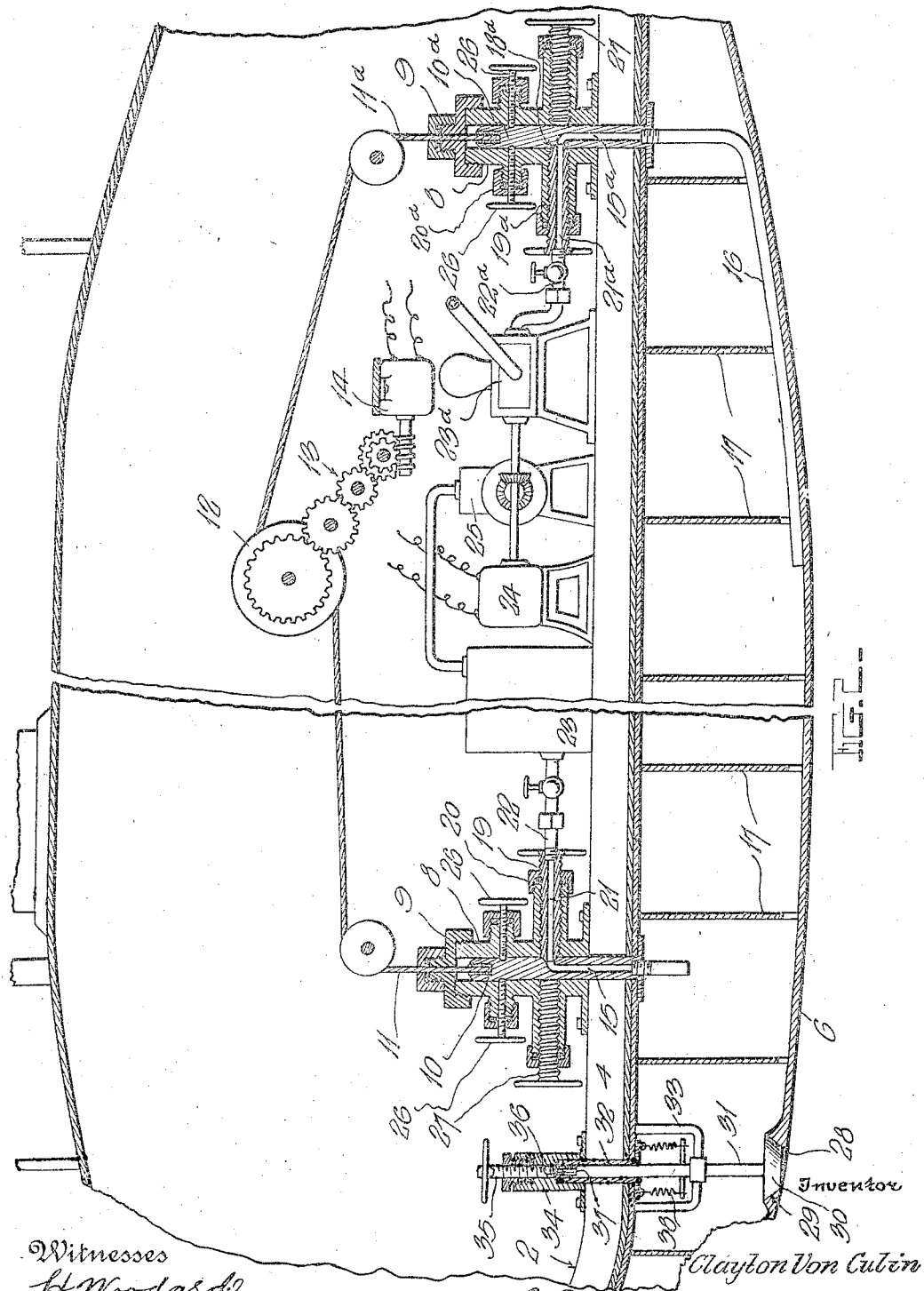
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 2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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SUBMARINE VESSEL.

1,175,848

Specification of Letters Patent.

Patented Mar. 14, 1916.

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To all whom it may concern:

Be it known that I, CLAYTON VON CULIN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Submarine Vessels; and I do 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.

My invention relates to improvements in submarine vessels so designed as to render first, safety to the crew, and second, safety to the vessel, it being allowed to rise to the surface of the water in case of emergency without employing any energy other than that of man.

Heretofore, the accidental loss of submarines and life thereon has been invariably due to broken or ineffective machinery preventing expulsion of the water from the water ballast tanks of the vessel, and thus preventing such vessel from rising to the surface. To overcome this difficulty, numerous means have been devised, among the most prominent of which is the method of equipping the vessel with a series of weights in addition to its water ballast tanks. By so doing, the weights may be released in case of necessity to increase the buoyancy of the vessel. The desired end is thus accomplished, but not without increasing the load of the vessel.

My invention bears closely on the type of improvement last mentioned, but rather than supplement the water ballast tanks with weights, I detachably secure said tanks to the vessel. Thus the construction of the ship is simplified, and no useless weight need be carried when the vessel is afloat, yet in case of emergency, the tanks filled with water may be released from the submarine, thereby increasing the buoyancy of the latter and allowing it to rise to the surface.

In the attainment of the end above specified, I employ certain novel features of construction, and unique combinations of parts of which the accompanying drawings are illustrative.

In these drawings: Figure 1 is a side elevation partly in section of a submarine constructed in accordance with my invention;

Fig. 2 is an enlarged central longitudinal section of a portion of the vessel; Fig. 3 is a vertical transverse section as seen on the plane indicated by the line 3—3 of Fig. 1; and Fig. 4 is a detail vertical section disclosing a coupling device which may be substituted or used in conjunction with those shown in the previous figures, for detachably connecting the vessel and the tank.

In specifically describing the invention, reference will be made to the drawings above briefly described by similar reference characters placed on corresponding parts throughout the several views. To this end, the numeral 1 designates the hull proper of the vessel, such hull being of the usual or any preferred construction with the exception that it is provided with a comparatively flat bottom 2 whose front end preferably curves upwardly at 3. It may here be stated that the hull, thus formed, may serve as a complete surface boat.

The bottom 2 of the hull 1 is equipped with a V-shaped rib 4 extending substantially throughout its length, said rib being received in a longitudinally extending groove or depression 5 formed approximately throughout the length of a water ballast tank 6 which extends from one end of the hull 1 to the other end thereof, being curved upwardly at 7 into contact with the upwardly curved end 3 of the bottom 2.

Secured in any preferred manner to the bottom of the hull 1 and disposed in said hull, is a pair of upright tubular female coupling members 8 preferably having stuffing boxes 9 at their upper ends. The members 8 receive removably therein a pair of upright male coupling members 10 and 10^a rising from the tank 6, the upper ends of said male members being secured to hoisting cables 11 and 11^a which rise through the stuffing boxes 9 on the members 8 and are wound upon an appropriate windlass 12 preferably driven through the instrumentality of a train of gears 13 from a suitable motor 14.

The male members 10 and 10^a respectively are formed with upright ports 15 and 15^a opening at their upper ends through one side of the members in question and communicating at their lower ends with the interior of the water ballast tank 6, the port

15^a being connected with a water outlet tube 16 disposed in the tank and extending beneath several of the usual wash plates 17 therein.

5 Seats 18 and 18^a are formed in the male members 10 and 10^a respectively, and the ports 15 and 15^a open through said seats, the latter being designed to normally receive therein the rounded inner ends of a pair
10 of clamping screws 19 and 19^a which are threaded transversely through the lower end portions of the female members 8, being preferably passed through stuffing boxes 20 and 20^a. The clamping screws 19 and 19^a
15 have formed longitudinally therethrough ports 21 and 21^a whose inner ends normally register with the ports 15 and 15^a respectively. Leading from the outer end of the ports 21 and 21^a, are two valved tubes 22
20 and 22^a, the former being in communication with a compressed air storage tank 23, while the tube 22^a leads to a water pump 23^a. The pump 23^a is driven by an appropriate motor 24 which likewise drives an air compressor
25 25 for compressing air into the tank 23.

From the foregoing description, it will be obvious that the clamping screws 19 and 19^a not only serve as means for establishing communication between the tank 23 and
30 the pump 20^a, and the interior of the tank 6, but they effectively serve to lock the male and female members 8 and 10 respectively against relative movement, thereby normally retaining the tank 6 in contact with the bot-
35 tom 2. However, the clamping action of the screws 19 and 19^a is preferably supplemented by auxiliary screws 26 threaded through the intermediate portions of the female mem-
40 bers 8 into seats or the like formed near the upper end of the male members 10. Furthermore, additional clamping screws 27 may be threaded transversely through the
aforesaid members 8 in axial alinement with the screws 19^a. The screws 27 may also be
45 used to obstruct communication between the upper and lower ends of the members 8 when the male members 10 are removed as will be hereinafter set forth.

For admitting water to the tank 6 for the
50 purpose of submerging the vessel, a water inlet 28 is provided, such inlet being equipped with a valve seat 29 with which a cone valve 30 coacts, said valve having an upright stem 31 projecting slidably through
55 a sleeve-like guide 32 rising from the tank 6 and through an appropriate bearing carried by a frame 33 suspended within the tank. The tubular guide 32 is normally received in an appropriate housing 34 within
60 the hull, and within this housing an operating member 35 in the form of a screw is mounted, the lower end of said screw being provided with a socket 36 for the reception of the squared upper end 37 of the
65 stem 31. Thus, the rotation of the screw

35 by a hand wheel or the like with which it is equipped, will force the valve 30 downwardly to close the inlet 28, or will allow springs 38 to open said valve, according to the direction in which the screw is turned. 70

In operation, assuming that the vessel is afloat with the tank 6 filled with air, and that it is desired to submerge the ship, compressed air from the tank 6 is allowed to pass through the ports 15 and 21 and through
75 the tube 22 into the storage tank 23, the air being expelled from the ballast tank 6 by the inrush of water through the opening 28, after the valve in the tube 22 has been opened to allow the escape of such air into
80 the aforesaid storage tank. Filling the tank 6 with water of course decreases the buoyancy of the vessel and causes the same to sink. In order to again rise to the surface, it is necessary to force air into the tank 6
85 and at the same time to expel the water therefrom, these operations being accomplished by the provision of the compressor 25, tank 23, and pump 23^a. It will thus be evident that if any one of these parts should
90 become ineffective for any reason whatsoever, the vessel could not rise were it not for the fact that the water laden ballast tank 6 is releasable. In such an emergency, therefore, all of the clamping screws bear-
95 ing against the male coupling members 10 and 10^a are released and the windlass 12 is allowed to rotate freely independently of its driving means, the result being that if the tank 6 rest upon the bed or the body of
100 water, the hull being relieved of the weight of said tank, will rise, during which operation the cables 11 and 11^a will unwind freely from the windlass 12. If the cables in question be of sufficient length, the hull 1 may
105 rise to the surface, but if the vessel be submerged in very deep water, it may be necessary to release such cables from the windlass 12. If this need necessarily be done, the tank 6 cannot be recovered, but if the
110 vessel proper may rise to the surface without completely detaching said tank, it will be obvious that when assistance arrives, the vessel may be supported and thus the tank 6 may be again raised to its normal position
115 and secured in place in the manner above set forth.

A vessel constructed as hereinbefore specified will be equally as efficient as those now in common use, yet it will be much more de-
120 sirable on account of the safety of the crew as well as of the entire ship.

I have described the entire arrangement of parts as constituting a submarine ship, but evidently a similar construction might
125 well be devised for use as a submergible harbor defensive fort. Obviously, if this be done, or in fact even when the device is in the form of a ship, the tank 6 may be released from the vessel proper and allowed
130

to rest on the bottom of the body of water, whereupon, as the ship proper or fort as the case may be, rises to the desired extent, rotation of the windlass 12 may be prevented.

5 Thus the buoyant part of the vessel, whether it be a ship or a fort, may be anchored at any desired depth.

The means above described for securing the tank 6 to the hull 1 might well be varied, and as suggestive of such a variation, I have 10 included Fig. 4 in the illustrative matter. In this figure, an upright tubular nut 40 rises from a portion of the tank 6 into an appropriate housing 41 carried by the bot- 15 tom 2 of the hull 1, and said nut receives therein an upright clamping screw 42 which may be released or applied at will by proper actuation of a hand lever or the like 43 with which it is equipped. The detail of con- 20 struction just described might be provided at any one of a number of suitable points throughout the length of the ship as will be obvious, or might well be used as fasten- ing means auxiliary to that above described.

25 The foregoing description, taken in connection with the accompanying drawings, will render the construction and operation of my improved submarine entirely clear to those skilled in the art to which the inven- 30 tion relates. Further description or exposition will not therefore be given, but in conclusion I wish to state that although certain specific details of construction have been shown and described for illustrative 35 purposes, numerous changes may be made within the scope of the invention as claimed, without sacrificing any of the advantages thereof.

I claim:—

40 1. A submarine vessel equipped with a releasable water ballast tank having a water inlet, means in the vessel for expelling water from the tank, cooperating coupling mem- 45 bers on the tank and on the vessel proper for securing the two together, a port in the member on the tank leading into the latter, and an additional port with which the first port normally registers, said additional port 50 being in communication with the aforesaid means.

2. A submarine vessel equipped with a releasable water ballast tank having a water inlet, means in the vessel for expelling water 55 from the tank, cooperating coupling members on the vessel proper, and on the tank, a port in the member on the tank leading into the latter, a clamping device carried by the other member for locking the two 60 members together, and an additional port in said clamping device normally aligned with the aforesaid port, said additional port being in communication with the aforesaid means.

3. A submarine vessel equipped with a releasable water ballast tank having a water

inlet, means in the vessel for expelling water from the tank, cooperating coupling mem- 65 bers on the vessel proper and on the tank, a port in the member on the tank leading into the latter, a clamping screw carried by the other member for locking the two members 70 together, and an additional port formed through said screw and normally registering with the aforesaid port, said additional port being in communication with the afore- 75 said means.

4. A submarine vessel equipped with a releasable water ballast tank having a water inlet, means in the vessel for expelling water 80 from the tank, a female coupling member carried by the vessel proper, a male coupling member carried by the tank and received in said female member, said male member having in one side a seat, a port in 85 the male member leading from the seat to the tank, a clamping screw threaded transversely through the female member and normally received in the seat, and an additional port formed through the screw and regis- 90 tering with the other port, said additional port being in communication with the aforesaid means.

5. A submarine having as its submerging and buoying means a releasable water bal- 95 last tank having a water inlet, a male coupling member rising from said tank and having a port delivering into the latter and opening through one side of said member, an upright female coupling member car- 100 ried by the vessel proper and receiving the male member therein, a cable secured to the male member and rising through the upper end of the female member, a windlass upon which said cable is wound, a clamping screw 105 threaded transversely through the female member into contact with the male member and having a port registering with the aforesaid port, and means in the vessel and in communication with the additional port 110 for expelling water from the tank.

6. A submarine vessel equipped with a releasable water ballast tank having a water inlet, an air supply in the vessel proper for forcing air into the ballast tank, a water 115 pump in said vessel proper for exhausting water from said tank, a pair of coupling members carried by the vessel proper and communicating respectively with the air 120 supply and water pump, and additional coupling members carried by the tank and cooperating with the aforesaid members.

7. A submarine vessel equipped with a releasable water ballast tank having a water inlet, a valve for said inlet having an up- 125 right operating stem provided on its upper end with a coupling member, an operating member carried by the vessel proper and having an additional coupling member for 130 cooperation with the aforesaid member, a pair of coupling members carried by the

vessel proper, an air supply communicating with one of said members and a water pump communicating with the other, and a second pair of coupling members carried
5 by the tank for cooperation with the aforesaid pair of members.

8. A submarine vessel equipped with a releasable water ballast tank having an inlet, a valve for controlling said inlet having
10 an upright stem equipped with a coupling member at its upper end, an operating member carried by the vessel proper and having an additional coupling member for cooperation with the aforesaid member, a third
15 coupling member carried by the vessel proper, a fourth coupling member carried by the tank and cooperating with the third member, and means in communication with said third member for expelling water from
20 the tank.

9. A submarine vessel equipped with a releasable water ballast tank on its under side, said tank having in its bottom a water inlet, a housing within the vessel proper
25 and opening through the bottom thereof immediately above the water inlet, an operating device in said housing and having a coupling member positioned downwardly, a valve for controlling the water inlet, and
30 a stem rising from said valve into the aforesaid housing and having an additional coupling member cooperating with the aforesaid member.

10. A submarine vessel having a releasable submerging weight, a male coupling member rising from said weight and having a seat in one side, a female coupling member carried by the vessel proper and slidably receiving the male member therein, and a clamping screw threaded trans-

versely through said female member into contact with the seat.

11. A submarine vessel having a releasable submerging weight, a male coupling member rising from the weight, an upright
45 female coupling member carried by the vessel proper and receiving the male member therein, a cable secured to the upper end of said male member and extending through the upper end of the female member, and
50 a windlass on which the cable is wound.

12. A submarine vessel provided substantially throughout the length of its bottom with a longitudinal rib, and a releasable submerging weight extending substantially
55 throughout the length of the bottom of the vessel and having a longitudinal depression receiving the rib therein.

13. A submarine vessel having a water ballast tank, means in the vessel proper for
60 filling and emptying said tank, and a multi-function coupling releasably securing said tank to the vessel proper and establishing communication between said tank and the
aforesaid means.

14. A submarine vessel having as its sole buoying and submerging means a water ballast tank and means to fill and empty the same, in combination with means for releasing and recovering said tank at will
70 to allow the vessel to quickly ascend and to be again submerged without emptying or filling said tank.

In testimony whereof I have hereunto set my hand in presence of two subscribing
75 witnesses.

CLAYTON VON CULIN.

Witnesses:

H. JARVIS BEACH,
OLIVER R. GRANT.