No. 832,646. PATENTED OCT. 9, 1906.

S. WIEBE.

SUBMARINE VESSEL.

APPLICATION FILED DEC. 19, 1904. RENEWED MAR. 8, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

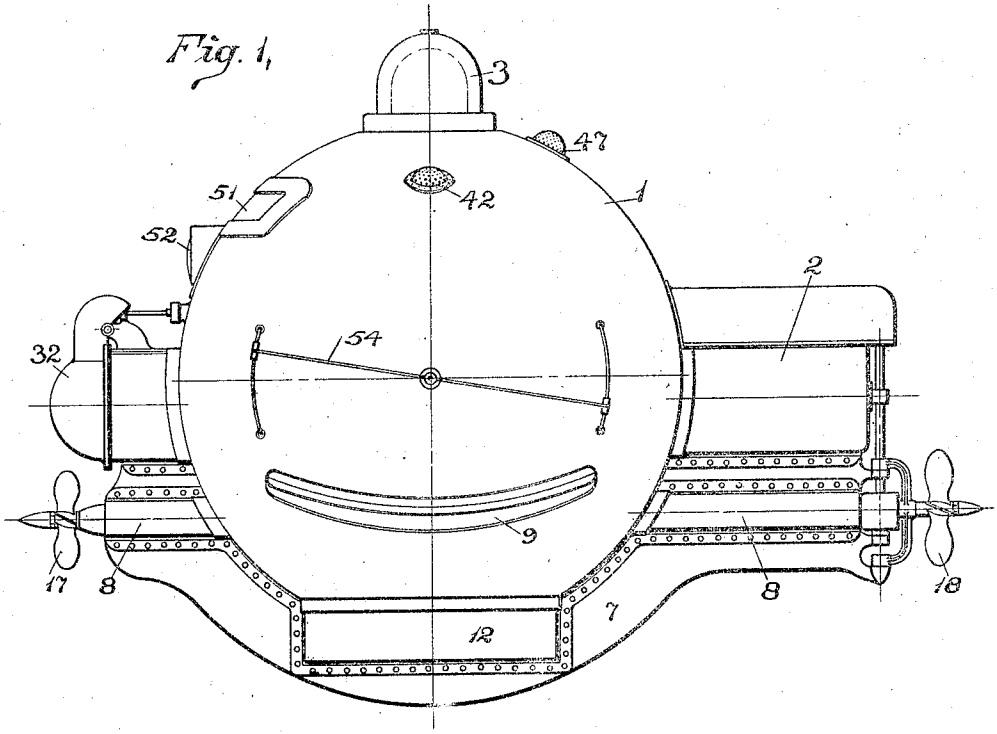
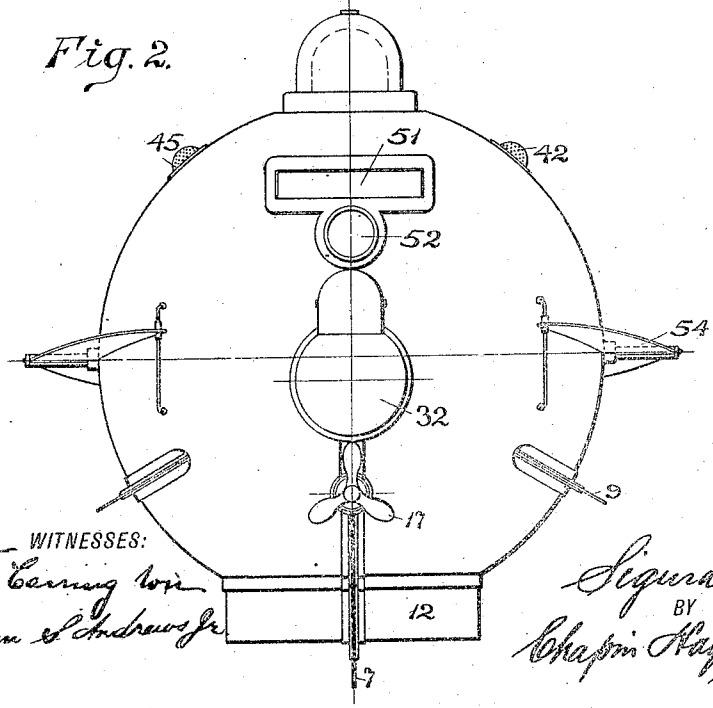


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

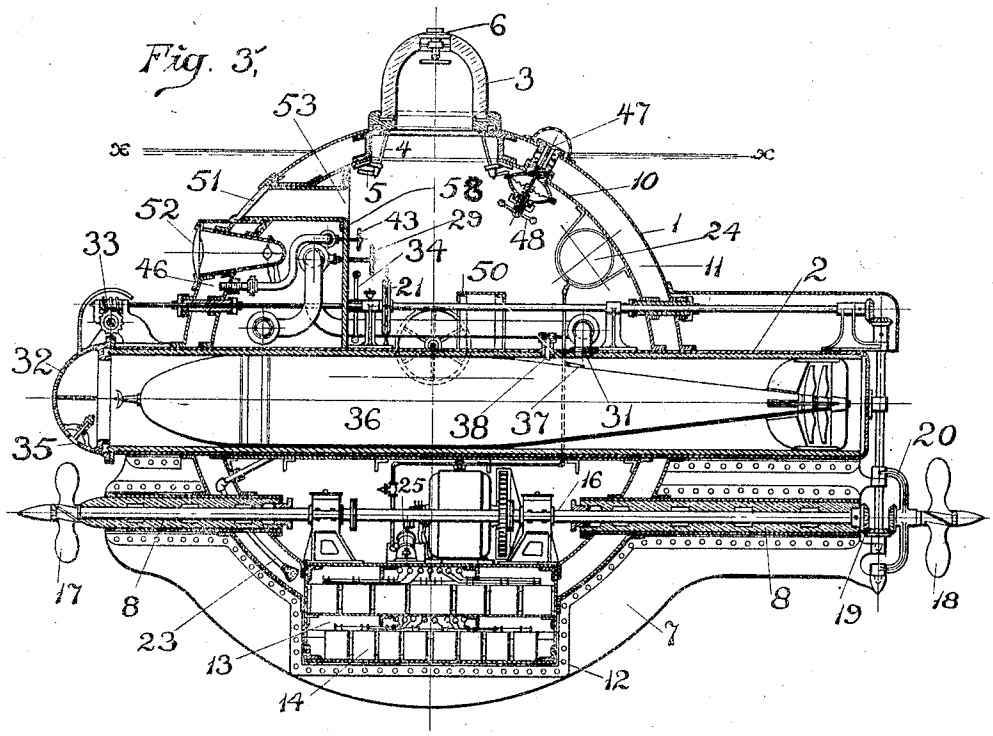
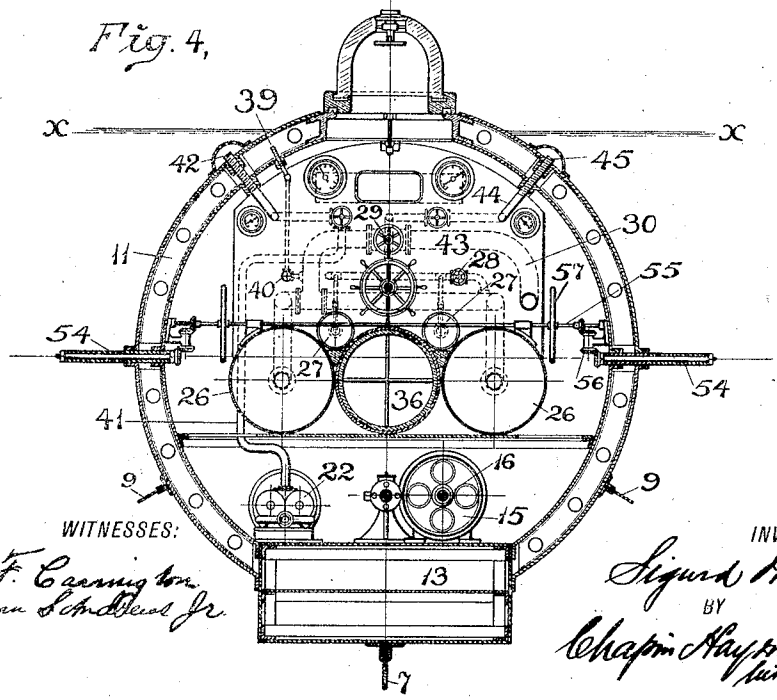


Fig. 4.



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SUBMARINE VESSEL.

No. 832,646. Specification of Letters Patent. Patented Oct. 9, 1906.

Application filed December 19, 1904. Renewed March 8, 1906. Serial No. 304,803.

To all whom it may concern:

Be it known that I, SIGURD WIEBE, a subject of the King of Sweden and Norway, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Submarine Vessels, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in submarine vessels, and particularly to improvements in submarine torpedo-boats.

The main objects of my invention are to provide a vessel having a maximum strength and rigidity of shell with a minimum weight; to reduce the size of the vessel to a minimum, so that a number of them may be easily transported from place to place, either on other vessels or by rail overland; to so arrange that the vessel may be controlled throughout from one point, so that it may be operated by a one-man crew; to provide for the proper balancing and maintaining of the balance or poise of the vessel under all conditions, and to provide several means for bringing the vessel to the surface after it has been submerged, such means not dependent one upon the other, so that in case one means should get out of order another means may be employed for the purpose.

My invention also consists in certain improvements in form, construction, and combination of parts, as will hereinafter more fully appear.

I will now proceed to describe a submarine vessel embodying my invention and will then point out the novel features in claims.

In the drawings, Figure 1 is a side view of a submarine vessel embodying my invention. Fig. 2 is an end view of the same looking toward the bow of the vessel. Fig. 3 is a view in central vertical longitudinal section of the same. Fig. 4 is a central vertical transverse section of the same looking toward the bow.

In general the vessel comprises a globular hull 1, pierced longitudinally by a cylindrical torpedo tube or shell 2. At its upper end the hull is provided with a conning-tower 3, which may be conveniently of heavy plate-glass and removably secured in position by any well-known means and by means of bolts 4, provided with wing-nuts 5, accessible from the interior. A suitable water-tight joint is formed between the conning-tower and the globular hull. A valve 6 in the extreme upper portion of the conning-tower 3 may be operated from the interior to permit the escape of foul gases from within the vessel when the same is running awash.

A longitudinal keel 7 is provided, said keel being preferably about the length of the torpedo-tube and preferably connected thereto and to the globular hull, whereby the various parts are stiffened and reinforced by each other. The keel also forms a support for the bearings 8 of the drive-shaft, as will be readily understood by inspection of the drawings. Bilge-keels 9 may also be provided, as may be desired, for the purpose of steadying the vessel, in a manner well known.

Within the outer shell of the globular hull 1 is a globular shell 10, a suitable space being left between the shell 1 and the shell 10, forming a chamber 11, which may conveniently be employed for the purpose of receiving the water-ballast employed for purposes of varying the weight of the vessel as a whole, so that it may be submerged or brought to the surface at will. Further, it will of course be understood that this construction of double hull tends to largely strengthen the vessel as a whole, one acting as a reinforcement for the other, and, further, should the outer shell 1 be damaged from any cause the inner shell might still be strong enough to prevent destruction of a vessel or the drowning of persons contained therein.

At its lower end the hull is provided with a rectangular chamber inclosed partially by a rectangular box-like projection 12. The chamber 13 may conveniently contain storage batteries 14, such as may be employed for furnishing motive power for operating the vessel. In vessels of this description it is extremely desirable to keep the weight as low as possible, as the low center of gravity shall tend toward stability. The storage batteries being very heavy and located at the lowest point of the vessel, and thus at the farthest point away from the geometric center of the vessel, tend largely to this desired result. Immediately above the chamber 14 is arranged an electric motor 15, geared or otherwise connected with the propeller-shaft 16, and in the present example of my invention I have provided the vessel with fore and aft propellers, the fore pro-

peller 17 being secured rigidly to the shaft 16 and the aft propeller 18 being secured upon a stub-shaft connected by gearing 19 with the propeller-shaft 16, the stub-shaft being mounted in a swinging bracket 20, controlled from a steering-wheel 21, whereby the said rear propeller may be employed for steering purposes. Other well known means may be employed for steering, if preferred As a matter of convenience, the electric motor 15 is shown on the starboard side of the vessel and a pump 22 is arranged opposite thereto on the port side. The pump may conveniently be of the centrifugal type, as shown, directly connected to a small electric motor, said motor receiving its current from the storage batteries, from which the motor 15 also receives its current. The pump 22 will have its suction-pipe 23 connected with the chamber 11 between the outer and inner shells 1 and 10, and the discharge for said pump may be at any point exterior of the vessel—as, for instance, through the pipe 41, leading to the exterior at 42. This pump may then be employed for the purpose of discharging water from the chamber 11 for bringing the vessel up to the surface after it has been submerged. A fresh-air receiver 24 is located within the vessel for supplying fresh air to the operator therein, and this receiver may be charged by means of a compressor 25, operated from the motor 15.

Located longitudinally of the vessel and upon either side of the torpedo-tube 2 are two main receivers 26 26, said receivers connecting through suitable pipe connections with carbonic-acid or other storage tanks 27, of which any suitable number may be provided. The carbonic-acid tanks are controlled by means of a valve 28, whereby the tanks 26 may be charged at will, and a valve 29 controls egress from the said receivers 26. From the valve 29 a pipe 30 leads into the torpedo-tube, having a connection therethrough at 31, so that by opening the valve 29 fluid under pressure may be discharged into the torpedo-tube for the purpose of launching the torpedo.

The receivers 26 may be termed "measuring-receivers," while the charging-tanks 27 constitute supply-tanks. A submarine vessel of this description may receive a number of the small charging-tanks 27 from a warship, the said tanks containing gas under exceedingly-high pressure, usually compressed to the form of a liquid. When connected up, the receivers 26 are arranged to hold just the right quantity of gas for filling the torpedo-tube to launch the torpedo at a pressure considerably lower than that in the charging-tank. Thus when it becomes time to launch the torpedo the gas from the receiver or receivers may be rapidly discharged into the torpedo-tube very much more quickly than it would be possible to discharge gas directly from the charging-tanks. Furthermore, the proper quantity of gas having been measured, exactly the right quantity will be employed, no more and no less.

The forward end of the torpedo-tube is provided with a swinging head 32, said head adapted to form a water-tight closure for the said tube, but arranged to be opened by means of a worm and screw connection 33, operated by a hand-wheel 34. The head 32 has a check-valve 35, which will close upon pressure from without, but will open to discharge fluid from within. An ordinary torpedo 36 is shown in Fig. 3 as contained within the torpedo-tube 2, the torpedo having its starting-trigger 37 located in the path of a spring-detent 38 in the tube, whereby the operating machinery of the torpedo may be automatically set in motion upon the launching thereof.

I preferably provide an auxiliary means for discharging the water from the chamber 11 in case the pump should fail to work from any cause, which means may conveniently be a branch pipe 39, connecting with the pipe-line leading from the main reservoirs 26 and controlled by a valve 40. By this means fluid under pressure may be forced into the chamber 11, the water contained in the said chamber being displaced thereby. The water so displaced may pass out through the pump-inlet 23, the pump 22, and the discharge-pipe 41 thereof or through other outlet, as may be provided. This means for admitting air or other gas may also be employed for admitting air or gas to replace the water discharged from the chamber 11 by the operation of the pump 22 when the pump is in working order. Water may be admitted into the chamber 11 by manipulation of the valve 43, which valve is arranged in a pipe 44 leading to the exterior of the vessel at 45 and to the chamber 11 at 46. The air displaced by the admitted water may be discharged through a valve 47, suitably operated by a hand-wheel 48, arranged at the interior of the vessel.

The operator for the vessel will be located within the globular shell above the torpedo-tube 2 and receivers 26, a seat 50 being provided for him. In this position the operator may look through a window 51, such window being arranged immediately above a search-light 52, so that he may be properly guided. By raising himself he may look through the conning-tower 3 and by this means look around in all directions. When looking through the window 51, he can of course only see in the direction in which he is going. In front of the operators' seat 50 is a board 58, upon and in front of which the various switches, gages, valves, and other devices are arranged. An opening 53 through the said

board is arranged in line with the window 51, and, as will be seen, the handles of the valves 29 43 28 40, &c., all project through the said board, and the steering-wheel 21 is arranged immediately in front of same, as is also the controlling-wheel 34 for the torpedo-tube cover. Various gages showing pressures, as well as the electrical indicators indicating amperage, voltage, &c., may all be arranged upon this board together with the various electric switches controlling the operation of the motors, the search-light, &c. The only valve or the like not immediately in front of him is the valve 47, the operating-handle of which is just above the shoulder of the operator and can be readily reached. Thus the whole vessel may be readily manipulated by one man and while this one man maintains a constant position. This is important, because the poise of submarine boats is very delicate, and the movement of an operator or operators about the vessel is sufficient to seriously interfere with the poise or balance thereof.

I have shown horizontal rudders 54, which project from the sides of the vessel, and these rudders may be employed for the purpose of causing the vessel to deflect upward or downward in its course while moving. These rudders may be employed to assist in the submerging or raising of the vessel, if the vessel is in motion and, indeed, will be sufficient to raise the vessel when in motion, even though the ballast in the vessel would be sufficient to submerge it when stationary, so that should the outer shell be punctured and the compartment 11 flooded without the possibility of relieving same the vessel might still be brought to the surface and maintained there so long as it is kept in motion by proper manipulation of the horizontal rudders. I have shown conventional means for operating them in a transverse shaft 55, gearing 56, and hand-wheels 57, arranged at either side of the operator's seat, but in practice, of course, other mechanism may be employed, as is desirable.

In operating the vessel the operator will descend to within same through the removable conning-tower 3, which he will lock in place after he is in position. At this time the vessel will be awash, as is shown in Figs. 3 and 4, *x x* denoting the water-level. The operator will now open the valve 28 and will charge the reservoirs 26, so that he will have fluid-pressure for launching his torpedo or for other purposes. The vessel may now be run awash by merely starting up the motor, and during this time the valve 6 may be open so as to freely admit fresh air, and fresh air thus admitted may be compressed in the tank 24. When it is desired to submerge the vessel, the valve 6 will be closed and the compression stopped. Water will now be admitted into the chamber 11 by manipulation with the valve 43, air from within the chamber 11 being discharged through the valve 47. The taking on of the additional ballast will cause the vessel to sink, and it will continue to sink until the chamber 11 is full of water or until the valve 28 is closed. The vessel will now be running submerged, the operator watching his course through the window 51 and steering the vessel by means of the steering-wheel 21. When he desires to fire a torpedo, he will open the head 32 by manipulation of the controlling-wheel 34, and when the mouth of the tube is wide open, so as to permit free passage with the torpedo, he may launch same by opening the large valve 29, admitting a great rush of gas to within the torpedo-tube behind the torpedo. The torpedo will thereby be launched, the trigger 37 being tripped by a detent 38, thereby starting the torpedo machinery in a manner well known. Directly the torpedo is launched, the valve 29 should be quickly closed, so as to prevent the escape of any more air or other gas under pressure, and the head 32 will then be again closed. After the head is closed the valve 29 may be opened sufficiently to allow the fluid under pressure to displace the water received within the tube during the launching of the torpedo, such water escaping through the valve 35. A certain quantity of water may be retained in the tube, if desired, in order to prevent the vessel rising before it is required to do so, the weight of the water retained being equal to the weight of the torpedo discharged. The vessel may now be run submerged as before, but may be returned to the surface at will by any one of several means. First, the water-ballast may be discharged from the chamber 11 by means of the pump 22, the pump, if desired, operating against a vacuum in the chamber 11, or air may be admitted through the pipe 39 to replace the water thus forced out of the pump. The second method of discharging the water may be employed, if desired— namely, the admitting of sufficient air or other gas under pressure through the pipe 39 to force the water in the chamber 11 out through the pump, even though the pump be not working, or through any other discharge provided. Third, the water retained in the torpedo-tube may be forced out by manipulation of the valve 29, the vessel being thereby lightened sufficiently to rise to the surface, or, fourth, should all these means fail the vessel may be brought to the surface while in motion by tilting the horizontal rudders 54.

By the foregoing it will be seen that I have provided an exceedingly compact structure, readily operated by one man, and that the structure is strong, rigid, and durable, though relatively light in weight. For instance, a vessel already designed by me of the type shown has an outside diameter of eight feet for the globular portion, with an

inside diameter of seven feet. The torpedo-tube is eighteen inches in diameter and twelve feet long, and the total length of the vessel over all is fourteen feet six inches. This is amply large enough for the one-man crew I employ, so that the weight over all is far less than that of any other submarine boat of which I have any knowledge at the present time. It will be noticed also that the vessel is perfectly balanced and the balance and poise thereof will be easily maintained. It will also be seen that I have provided abundant means for bringing the vessel to the surface, so that ordinary accidents or breaking down of machinery would not result in loss of the vessel and the operator therein, and even considerable damage to the hull will not necessarily flood the vessel or prevent the rising of same.

It will of course be understood that while I have shown but one torpedo-tube I may employ more than one, if desired, and that various changes and modifications may be made within the scope of my invention. It will also be understood that certain parts thereof may be employed with parts of other construction, if desired, and hence I do not wish to be limited only to the precise details of construction and combination of parts herein shown and described.

What I claim is—

1. A submarine vessel comprising a substantially globular hull, and having a cylindrical torpedo-tube longitudinally arranged through said globular hull, and a longitudinal keel connected to said hull and to said tube, substantially as set forth.

2. A submarine vessel comprising a globular hull composed of two substantially spherical shells spaced apart, and having a cylindrical torpedo-tube penetrating both said shells longitudinally.

3. A submarine vessel comprising a substantially globular hull having a cylindrical torpedo-tube penetrating same longitudinally, said hull provided at its base with a chamber formed in a portion projecting downwardly therefrom, said chamber weighted.

4. A submarine vessel comprising a substantially globular hull having a cylindrical torpedo-tube penetrating same longitudinally, said hull provided at its base with a chamber formed in a portion projecting downwardly therefrom, and electric batteries arranged in said chamber.

5. In a submarine vessel, the combination with a globular hull comprising two concentric substantially spherical shells connected together but of different diameters whereby a space or chamber is left between them, of means for admitting and expelling water from the space between said shells.

6. In a submarine vessel, the combination with a substantially globular hull, of a torpedo-tube penetrating same longitudinally, reservoir-tanks arranged parallel with the torpedo-tube, a motor for driving the vessel arranged beneath the torpedo-tube and the reservoirs, and electric batteries arranged beneath the said motor.

7. In a submarine vessel, the combination with a torpedo-tube, of an air or gas measuring receiver arranged to connect therewith, and an independent air or gas charging-tank arranged to connect with the said receiver.

8. In a submarine vessel, the combination with a substantially globular hull, a torpedo-tube carried thereby, means for propelling and steering the boat, means for launching a torpedo, and means for admitting and discharging liquid ballast, of a chamber for a one-man crew, the operating and controlling devices for the said propelling, steering, torpedo-launching and ballast-controlling mechanism arranged within said chamber and all within reach from one point.

9. In a submarine vessel, the combination with a substantially globular hull, of shaft-bearings projecting fore and aft from the hull, and a fin-keel connected to the hull and to the said bearings.

10. In a submarine vessel, the combination with a substantially globular hull, of a torpedo-tube arranged longitudinally through said hull, shaft-bearings projecting fore and aft from said hull, and a fin-keel connected to said hull, said shaft-bearings, and to the projecting portions of said torpedo-tube.

11. In a submarine vessel, the combination with a substantially globular hull, of a rectangular projection at the base thereof, said rectangular projection inclosing a chamber arranged to receive a heavy weight, and a fin-keel connected to said hull and interrupted by the said rectangular projection.

12. In a submarine vessel, the combination with a globular hull comprising two substantially cylindrical shells arranged one within the other and of different diameters whereby a chamber is left between them, of a torpedo-tube penetrating longitudinally through the said hull, and projecting fore and aft therefrom, a movable cap or closure for the forward end of said torpedo-tube, and means for admitting air or other gas under pressure to between the shells to expel water therefrom, and to the torpedo-tube to expel water therefrom when the said cap is closed, substantially as specified.

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Witnesses.
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