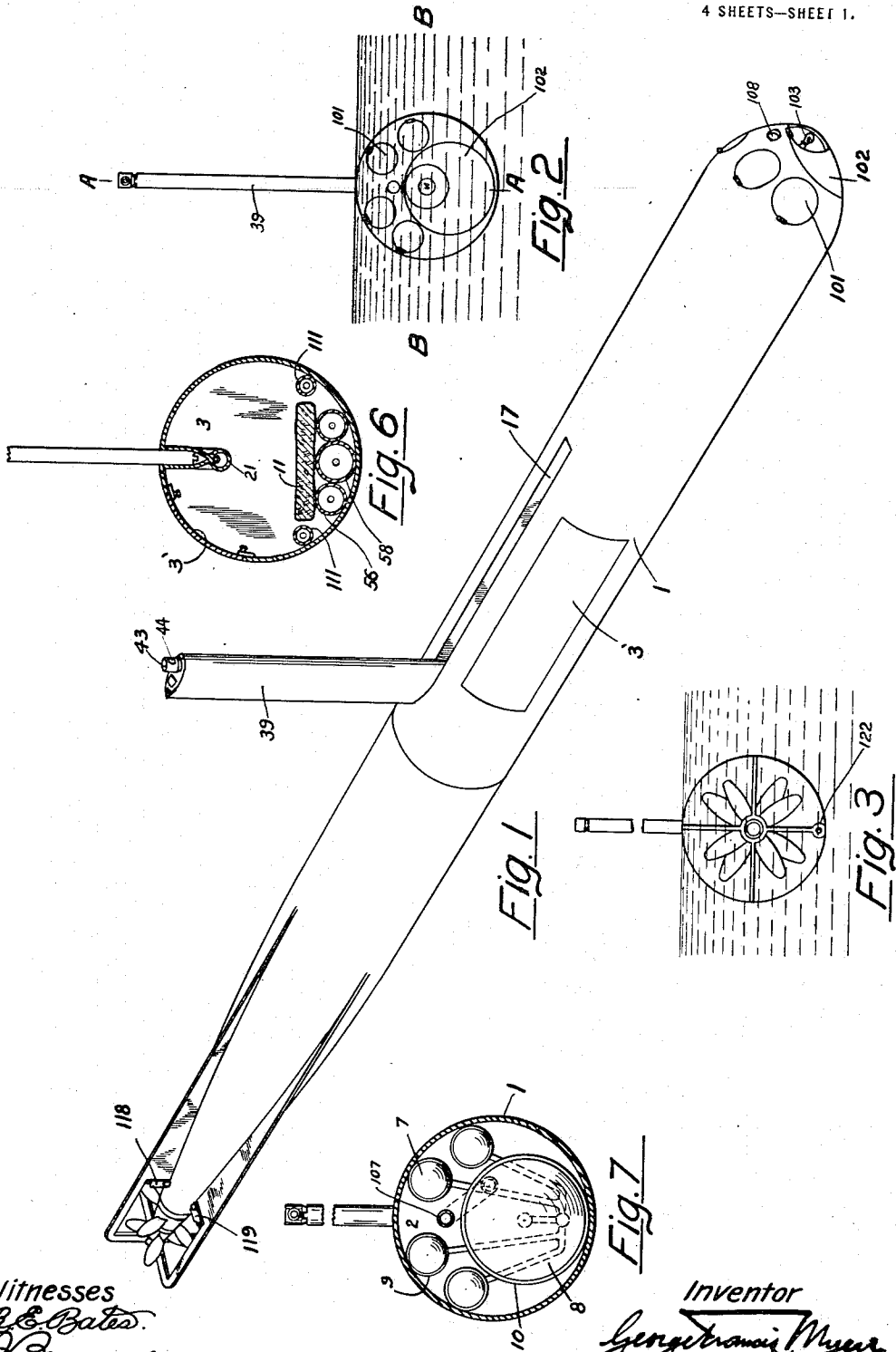


1,295,355.

G. F. MYERS.  
TORPEDO.  
APPLICATION FILED AUG. 3, 1915.

Patented Feb. 25, 1919.  
4 SHEETS—SHEET 1.



Witnesses  
*R. E. Bates.*  
*R. J. Parsons*

Inventor  
*George Francis Myers*

1,295,355.

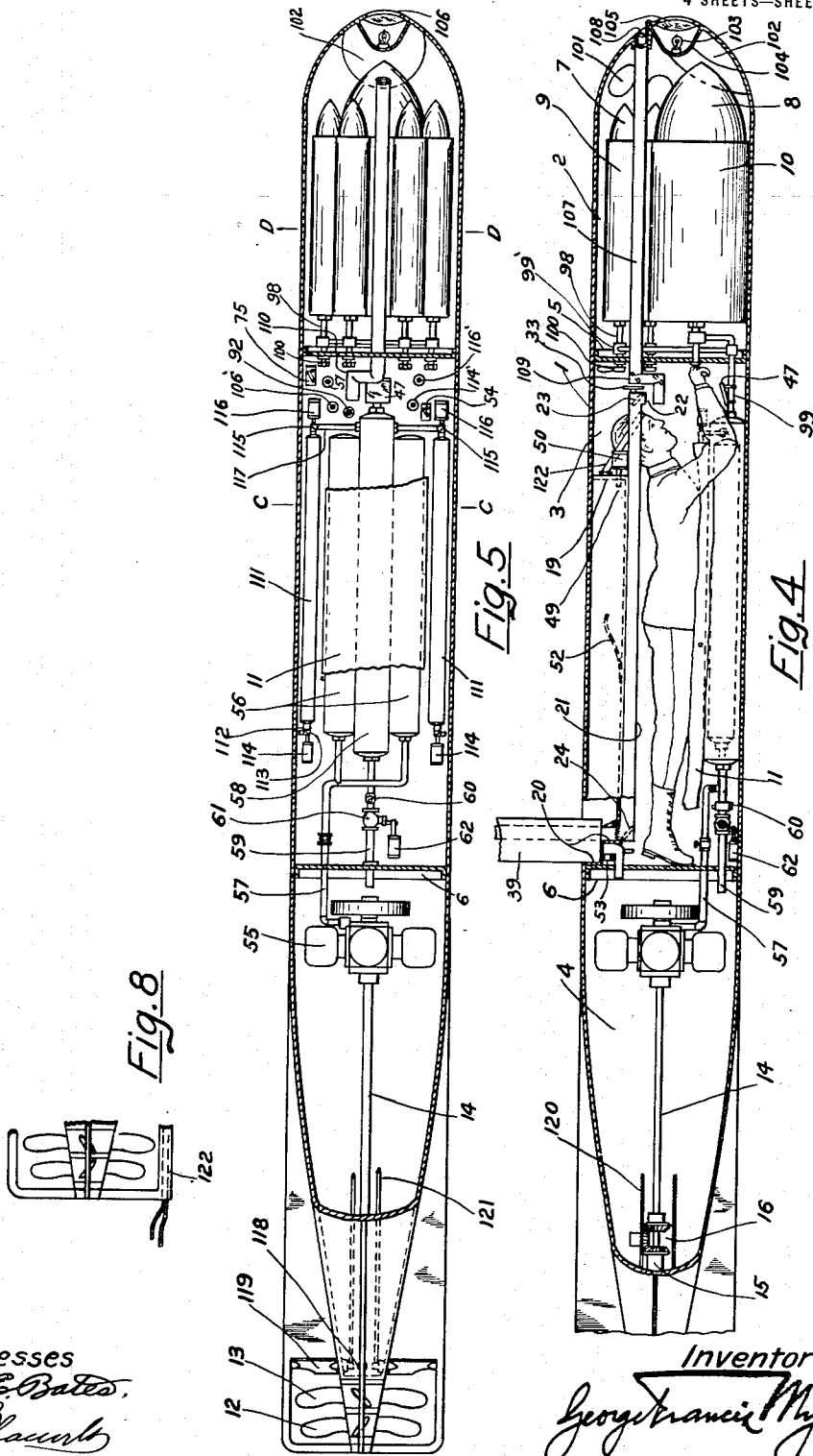
G. F. MYERS.

TORPEDO.

APPLICATION FILED AUG. 3, 1915.

Patented Feb. 25, 1919.

4 SHEETS—SHEET 2.



Witnesses  
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G. F. MYERS.  
TORPEDO.

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Patented Feb. 25, 1919.

4 SHEETS—SHEET 4.

1,295,355.

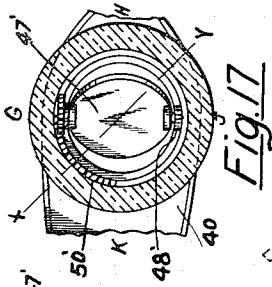


Fig. 17

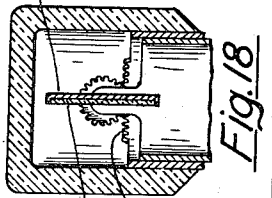


Fig. 18

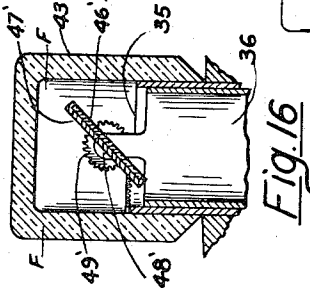


Fig. 16

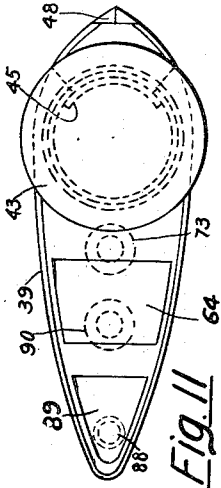


Fig. 11

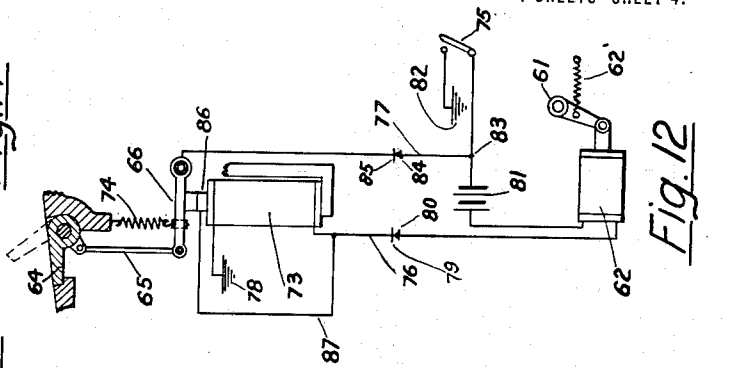


Fig. 12

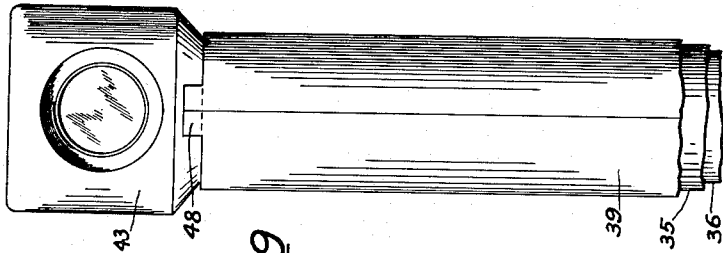


Fig. 9

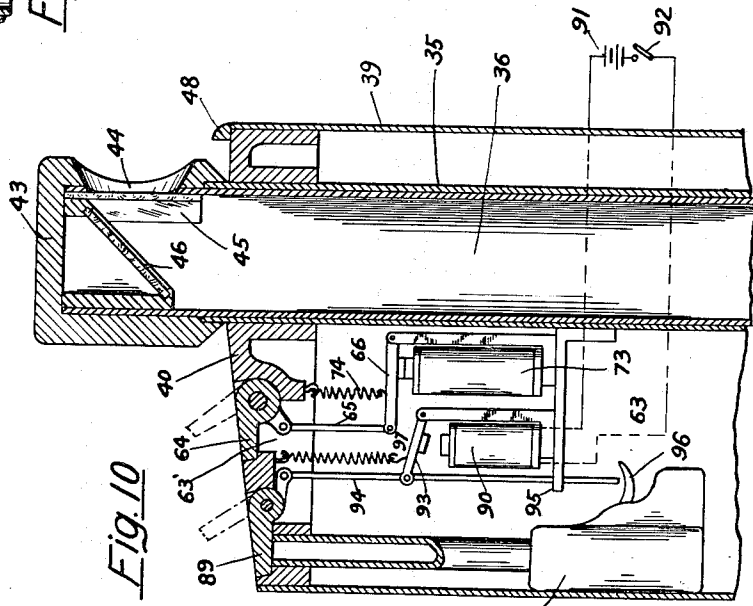


Fig. 10

Witnesses  
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# UNITED STATES PATENT OFFICE.

GEORGE FRANCIS MYERS, OF BUFFALO, NEW YORK, ASSIGNOR TO SUBMARINE ARMS CORPORATION, OF NEW YORK, N. Y.

## TORPEDO.

1,295,355.

Specification of Letters Patent.

Patented Feb. 25, 1919.

Application filed August 3, 1915. Serial No. 43,399.

To all whom it may concern:

Be it known that I, GEORGE FRANCIS MYERS, a citizen of the United States, and residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Torpedo, of which the following is a specification.

This invention relates to an improvement in marine vessels, commonly known as submarines, but having as its principal characteristic such form and dimensions that it can, and is primarily intended to be readily inserted and projected from a torpedo firing tube such as is generally carried by naval vessels and it is closely allied with that class of automatically controlled weapon (carrying an explosive charge and projected from a launching tube) known as a torpedo to the extent stated, and in addition has an independent dirigibility and functional action not possessed by the automobile torpedo and is capable of a far greater range of action than that weapon is capable of, even to the extent of returning to its base or starting point after having performed its mission.

After having been launched it may be stopped, started or reversed; it may be deviated from its straight course, or dive, rise, maneuver, deliver its explosive charge, reconnoiter and return to its base to receive another charge if desired.

In acquiring this increased adaptability and efficiency of my invention over the automobile torpedo I have associated with the vessel proper certain combinations of elements variously placed and functioning under the control of a human operator, having a compartment for his occupancy, and if the hull be made large enough an assistant or associate operator may be employed therein; all of which is hereinafter fully described in detail and illustrated by the accompanying drawings, in which Figure 1 is a perspective view of my invention as it would appear in use after leaving the firing tube; Fig. 2 a front elevation; Fig. 3 a rear elevation; Fig. 4 a cross-sectional view taken at A—A Fig. 2; Fig. 5 a cross-sectional view taken at B—B Fig. 2; Fig. 6 a cross section taken at C—C Fig. 5; Fig. 7 a cross section taken at D—D Fig. 5; Fig. 8 a side elevation of the extreme stern, Fig. 9 a front elevation of the upper portion of the periscope; Fig. 10 a cross section of same; Fig. 11 a plan view of same;

Fig. 12 a diagram of electric circuits controlling the air circulating system; Fig. 13 a cross section of the portion of the vessel wherein is located the pivotal mounting of the periscope; Fig. 14 a cross section taken at E—E Fig. 13; Fig. 15 a plan view of Fig. 13; Fig. 16 a cross section of the periscope cap adapted for horizontal vision; Fig. 17 a horizontal cross section taken at F—F Fig. 16; and Fig. 18 a vertical cross section on line X—Y Fig. 17, showing the mirror in a vertical position.

1 is a shell or hull, having an outline or form similar to the automobile torpedo now in general use but with the interior preferably divided into three sections or compartments, 2, 3 and 4, separated by bulkheads 5 and 6. The forward compartment 2 contains preferably a group of projectiles 7 and 8 contained in tubes 9 and 10, these projectiles being preferably of different sizes for purposes hereinafter explained. The intermediate compartment 3, having a hatch 3' conveniently located, is provided for the operator and he is shown in Fig. 4, lying upon a pad 11 placed upon flasks 56 and 58 with the various manipulating control elements within easy reach.

The after compartment 4 contains the propulsion motor, herein shown as a gasoline engine driving the oppositely revolving propellers 12 and 13 as is usual in machines of this class, 12 rotating by the control shaft 14 connected to the motor and the propeller 13 being attached or mounted upon the hollow shaft 15 and rotated in the opposite direction by means of bevel gears 16, thus to equalize the torque, or tendency to twist or rotate the torpedo.

It is apparent that in a vessel of this character wherein the operator is wholly enclosed within the hull there must be some means by which visibility of surroundings or location is afforded the operator that he may work intelligently such as the periscope commonly used by submarines, which projects vertically therefrom. But it is equally obvious that a periscope as thus constructed would not be applicable to a torpedo form of submarine vessel adapted to be fired from a tube.

Therefore to fulfil these requirements, I have conceived a periscope of special construction which also embodies the additional features of vertical sight and gun fire en-

abling the operator to observe conditions above the torpedo and protect himself from aircraft. A description of the construction preferably employed for horizontal sight is given followed by that for vertical sight. Referring to the drawings it will be noted that immediately above the prone form of the operator is a recess 17, formed in the hull or shell, having parallel sides 18 and a plain closure 19 at its forward end and a stepped closure at its rear end 20. Attached to the underside of this recess is a tube 21 extending from the stepped end forward and beyond the end 19 at which end there is an opening 22 pointing downwardly and having a ninety-degree reflecting medium 23. At the rear end of this tube which is closed, shown in Fig. 13, there is another such medium 24. The rear end of the tube forms an L with its short length 25 projecting vertically therefrom. Within this vertical portion is suitably mounted for rotation a short length of tubing 25' having a retainer 26 and a gear 27 formed at its lower edge. Its upper edge is serrated as at 28. Secured within is a transparent disk 29 whose upper surface coincides with the lower edge of the serration. Secured to the upper surface of the tube 21 is a bearing 30, in which is mounted shaft 31 carrying pinion or gear 32 which engages gear 27. The shaft extends through the entire length of the tube and projects through the forward end carrying a hand wheel 33. Pivotaly mounted, adjacent to the vertical section of the tube 25 by means of hinge 34, is a tube 35. Within this tube is another tube 36 which has a serrated end 37 corresponding to the serrated edge 28 of the short tube with which it engages when tube 36 is in an erect position. Within the tube 36 is secured a transparent disk 38. Tube 35 carries a structure formed of a casing 39 having a form such as would present the least resistance to forward movement and leave as little disturbance as possible in its wake having a top closure 40 and bottom closure 41, the bottom being at a position properly distant from the hinge 34 to cause bottom 41 to rest squarely upon, and entirely in contact with, step 42 of the periscope recess when the periscope's movable member is raised to a vertical position. In Fig. 10 it is shown that tube 36 extends beyond the tube 35 at its upper end. Secured to tube 36 is the cap 43 having an opening 44 covered by glass 45. A ninety-degree reflecting medium 46 is positioned in the cap at the juncture of the axis of hole 44 and tube 36. In Fig. 4 is shown a mirror 47 suitably mounted to reflect light from reflector 23 in tube 21 to the operator's eye. Thus it will be evident that there is clear vision from his eye to the outside of the torpedo when the periscope is vertical, through reflectors 47, 23, 24, 46 and the hole 44. Referring to Figs. 16, 17 and 18, 43' is a transparent cap secured to stationary tube 35. The mirror secured in frame 46' is pivotally mounted on bearings 48' formed on the revolving tube 36. 49' is a pinion carried upon the mirror shaft and is adapted to engage segmental rack 50' formed on the end of tube 35, for rotating the mirror upon its free shaft, the mirror remaining in its inclined position when not engaging the rack as its rotation is opposed by a friction pressure on its bearings. When the torpedo is not in active service or is within its firing tube the periscope's movable member lies within the recess 17 retained by means preferably consisting of a lug 48 located upon the top closure 40 of the periscope casing and adapted to engage the projecting stem 49 of the armature having an elastic opposition of electromagnet or solenoid 50 connected with an electric circuit, and which is mounted upon the stationary member of the periscope and is controlled by a push button 51 conveniently placed within reach of the operator. Located within the recess 17 is a leaf spring 52 adapted to be held compressed by the folded and latched periscope member. The spring possesses sufficient power and range to throw the periscope out of and above the recess 17, its further movement to a vertical position being accomplished preferably by the pressure of the water as the vessel travels forward. In its vertical or active position the lower closure 41 rests upon and in close contact with step 42' of the recess 17 and serrated ends 28 and 37 of tubes 25' and 36 are engaged for mutual rotation. The water pressure may be sufficient to retain the periscope vertically, but means is also provided for locking it thus, which may be necessary in traveling astern, which consists preferably of a magnetic device as shown in Figs. 4 and 13, where 53 is a pair of electromagnets secured within the hull and at their upper ends to the step 42 of the recess 17. Lower closure 41 being composed of a suitable metal will be held, as an armature, against the poles of the magnets. A controlling switch 54 in circuit with these magnets is located within convenient reach of the operator. It will now be apparent that by this novel construction a periscope is provided that can be folded to a position within the outline of the hull for the purpose of allowing its entry into the torpedo firing tube. My folding periscope forms part of a combination of elements which I employ to function in other important features of my invention which will now be set forth. In illustrating my invention I have employed an internal combustion motor or motor using liquid fuel, for propulsion, or it may be any form of motor requiring a supply of air or its equivalent to promote its operation. This could be supplied from a

flask or container of stored gas but this alone is objectionable on the grounds of limitation of supply. It is necessary therefore to draw upon the outside air in order to extend the range of action. As my torpedo can travel submerged or at the surface of the water with its periscope erect and projecting therefrom, I employ the following described means to supply air to the engine as required during the consumption of the entire fuel supply: 55 is the motor supplied with fuel from the tanks 56 through the pipe 57. 58 is a flask of stored air resting upon the bottom of the operator's compartment having a pipe 59 communicating with the after compartment 4. Air from the flask is controlled by a pressure reducing valve 60 and a valve 61 which is shown in an open position by magnet 62 against the action of spring 62' in the manner shown in Figs. 4, 5 and 12. Air from outside the vessel is also supplied to the after compartment and motor, alternating with the air in flask 58, as the upper end of the periscope submerges or emerges from the water. To accomplish this I utilize the space 63 as an air passage having an outlet 63' in the top 40, provided with a hinged cover 64. Communication between this space and the afterbody is established in the manner shown in Fig. 13 thus: A hinged valve 67 is located upon the step 42 of the recess 17 opening into the pipe 68 which terminates in the after compartment 4 and from which depends drip pipe 69. A valve 70 opens inwardly to the space 63. Both of these valves are normally closed by their springs as shown until the periscope is brought to its operative or active position in which case the projection 71 engages with valve lid 70 causing it to open, and projection 72 operates similarly upon valve lid 67 thus opening up the passage. The valve lid 64 is connected by link 65 to armature 66, which is controlled by electro-magnet 73, opposing the action of spring 74. Conveniently located within reach of the operator is the switch 75. Fig. 12 shows the method of connecting the valves 64 and 61, the flask controlling magnet 62 and the controlling switch 75, which is accomplished by using but two wires 76 and 77 and a grounded connection 78 and 82. Winding of magnet 73 is connected or grounded at one terminal to the periscope casing as 78 and its other terminal to wire 76 connecting with female member of plug switch 79, the male member 80 of which is connected to one end of winding of valve magnet 62. The other terminal of this magnet is connected to the source of energy 81 which is in turn connected to switch 75 and through same to the ground connection at 82. Intermediate the switch 75 and source of energy 81 is a connection 83 from which is led a wire 77 through

the plug switch 84 and 85 to the insulated armature 66. When valve lid 64 is closed the armature makes contact with core 86 which is connected to wire 76 by wire 87.

It may be desirable under certain conditions to provide a firearm within the periscope casing for firing skyward as a protection against air craft and to this end I show in substance an arrangement by which this may be accomplished. 88 is a gun of any suitable design secured within the casing 39 with its muzzle passing through the closure 40 and covered by the flap or cover 89. 90 is an electromagnet with its circuit and source of energy 91, shown in diagrammatic form, with switch 92 which would be placed within the operator's compartment. The armature 93 is connected by link 94 to the gun muzzle cover 89 and also to a rod passing downwardly through guide 95 to a proper position for operating trigger 96 after cover 89 has opened sufficiently to clear the path of the projectile. A spring 97 connects the armature with the top closure 40 of the casing tending to keep the muzzle cover closed when armature 93 is not energized thus preventing water from entering the gun.

In the forward compartment 2 the projectiles 7 and 8 are shown within their firing tubes 9 and 10, the larger one being placed underneath in order to have the center of gravity low as possible, with pipes, as 98, connecting each one with the bus-pipe 99, passing through bulk-head 5 to the flask 58. Each pipe 98 has a valve 99' with stem passing through the bulkhead and terminating in a handle 100. In the forward end of the hull and in line with each projectile are hinged covers 101 and 102. The large one 102 carries an electric head light 103 in casing 104 which is furnished with lens 105 covering the opening 106 in the cover. A switch or push button 106' in the operator's compartment controls the head light. Just above the large cover hinge is a tube 107 having a lens covered opening at 108 in its forward end and its other end passing through the bulkhead. It there forms an L 109 passing downwardly to one side of the center-line of the hull as shown in Fig. 7 where it again forms an L 110 and terminates within a convenient distance from the operator's eye. Within the said L's are secured ninety-degree reflecting members. By this arrangement a view of the surroundings forward of the torpedo can be had by the operator. 111 is a ballast tank having its rear end opening to the outside of the hull by pipe 112, which has a controlling valve 113 operated by electromagnet 114 and controlled by electric push button 114'. At the forward end of the tank is a similar valve 115, which is normally closed and controlled by electric push button 116', operated by

magnet 116 controlling air from the flask 58 through pipe 117 to the tank 111. The armatures of these valve magnets have springs opposing the magnetic attraction.

5 The steering of the torpedo both vertically and horizontally is accomplished in the usual manner common to this class of machines by the use of vertical rudders 118 and horizontal rudders 119 having connecting cables 10 120 and 121. The actuating system for controlling the rudders may be of any of the well known devices for this purpose as practised in the submarine and torpedo art.

The lower strut 122, Fig. 8, is hollow in 15 form for the purpose of carrying such as telephone wires for communication between the operator and the firing station should such be desirable and when thus used the electric cables may be wound upon a reel 20 which may be located within the torpedo or at the firing base.

A strap 122 secured to the end of periscope recess 17 forms a support for the operator's head.

25 The operation of my invention is as follows:

The operator takes up his position within his compartment lying upon the pad and inserting his head in the rest strap. With 30 the periscope folded and latched within its recess the torpedo is inserted in the firing tube from which it is launched. As the machine is entirely self-contained and independently dirigible the vessel carrying the firing tube may not necessarily aim at the 35 target and may fire several torpedoes from different sides, thus causing no delay or trouble in turning large vessels especially when they carry submerged torpedo tubes.

40 Having emerged from the firing tube the operator starts his propeller engine and presses electric push button 51 releasing the periscope which rises to its vertical position. If at the start the torpedo is at a depth 45 where the top of the periscope is submerged the wave action or pressure of the water will close the valve 64 preventing an inrush of water. A small portion may enter during the valve action but this will be drawn 50 through the drip-pipe 69 and expelled by proper means such as a bilge pump. Upon the closing of valve 64, stopping off the outside air supply to the engine, air will be automatically released from the flask 58 55 which will continue until the periscope again emerges. Thus a constant alternating supply of air will be furnished the motor. The closing of valve 64 and opening of valve 61 supplying air from the flask 58 to the water 60 may be performed by closing switch 75 when desirable. The operator will now continue his course whether at surface or submerged. If he desires to submerge he presses electric push button 114' which 65 causes magnet 114 to open the valve 113

allowing water to enter the tank 111 causing the vessel to descend to a depth governed by the increased weight proportional to the amount of water admitted. To ascend the button 116' is pressed, together with button 7 114', allowing air from the flask 58 to expel the water thereby increasing the buoyancy of the torpedo and causing it to rise. With the periscope above water the operator may observe the surrounding condition by re- 7: volving the hand wheel 33. In turning the mirror from G to H, J or K, Fig. 17, it remains at a forty-five degree inclination. When desiring to look above the torpedo he 8: turns tube 36 until the segmental rack rotates the mirror sufficiently to bring it to a vertical position as in Fig. 18. This will enable him to see above and direct the time of firing the periscope gun.

When submerged the operator may ob- 85 serve objects ahead such as explosive mines or other submarines through tube 107 which forms a horizontal periscope and is assisted by the illumination of the headlight controlled by the switch in his compartment. 90

When the torpedo is within striking distance of the target the operator, selecting the size of projectile most suited to accomplish the desired result from an economical stand- 95 point, pulls the corresponding valve lever controlling the expelling medium, which fires the projectile from its tube through the forward door.

Having described my invention, I claim:

1. A submergible vessel comprising a hull, 10: a projectile compartment in the forward part of the said hull, an operator's compartment amidships, an engine compartment aft, and a disappearing pivotable sighting device lying with its component parts assembled 105 below the periphery of the said operator's compartment when inactive and projecting above the same when active.

2. A submergible vessel comprising a hull, a projectile compartment in the forward 110 part of the said hull, an operator's compartment amidships, an engine compartment aft, and a disappearing pivotable sighting device lying with its component parts assembled outside of the sheathing but re- 115 cessed within the outer periphery of the said operator's compartment when inactive and projecting above the same when active.

3. A submergible vessel comprising a hull, a compartment in the said hull for holding 120 a projectile, a compartment for holding an operator, a compartment for holding an engine the said compartments being in alignment one with the other and the said engine compartment comprising a gasolene engine 125 and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, 130



and means comprising connections leading from one valve to the other to open the said second mentioned valve substantially at the instant that the said first mentioned valve closes.

4. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the said compartments being in alinement one with the other and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, and automatic means comprising connections leading from one valve to the other to open the said second mentioned valve substantially at the instant that the said first mentioned valve closes.

5. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the three compartments being in alinement one with the other and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, means when the first mentioned valve closes to open the said second mentioned valve, and means comprising connections leading from one valve to the other when the said first mentioned valve re-opens to close the said second mentioned valve.

6. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the three compartments being in alinement one with the other and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, automatic means when the said first mentioned valve closes to open the said second mentioned valve, and automatic means comprising connections leading from one valve to the other when the said first mentioned valve re-opens to close the said second mentioned valve.

7. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the said compartments being in alinement one with the other and the said engine

compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a compressed air tank a valve therein, means for opening and closing the same, and means for holding the said first mentioned valve open, the said means permitting the waves to close the said first mentioned valve and thereby acting on the said means for opening the said second mentioned valve.

8. A submergible vessel comprising a hull, a projectile compartment in the forward part of the said hull, an operator's compartment amidships, an engine compartment aft, a disappearing sighting device lying with its component parts assembled below the periphery of the said operator's compartment when inactive and projecting above the same when active, a gasolene engine mounted in the said compartment, a tube through which atmospheric air is admitted to the said engine, and a casing of stream line form surrounding the said sighting device and the said tube.

9. A submergible vessel comprising a hull, and a disappearing member comprising a stream line form casing with its greatest width forward of its transverse center line lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active, means for holding the said member in its inactive position and means for holding the same in its active position, the said means also lying below the periphery of the said hull.

10. A submergible vessel comprising a hull, an operator's compartment in the said hull, and a disappearing member comprising a substantially hollow shell lying uncovered and with its component parts assembled inside of the outer periphery of the said operator's compartment when inactive and projecting above the same when active.

11. A submergible vessel comprising a hull, and a disappearing and pivotable member comprising a substantially hollow shell lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active.

12. A submergible vessel comprising a hull, a disappearing member comprising a hollow shell forming an air duct leading to the interior of the said hull and lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active, and a valve at one end of the said hollow shell.

13. A submergible vessel comprising a hull, and a disappearing member comprising a substantially hollow shell having a revoluble member lying parallel with the axis of

- the said shell and lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active.
- 5 14. A submergible vessel comprising a hull, an operator's compartment in the said hull, and a disappearing member comprising a substantially hollow shell comprising a sighting device lying uncovered and with its component parts assembled inside of the outer periphery of the said operator's compartment when inactive and projecting above the same when active.
- 10 15. A submergible vessel comprising a hull, and a disappearing pivotal member comprising a substantially hollow shell comprising a sighting device and lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active.
- 15 16. A submergible vessel comprising a hull, and a disappearing sectional member comprising a substantially hollow shell comprising a periscope and lying below the periphery of the said hull when inactive and projecting above the same when active.
- 20 17. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine, the said compartments being in alinement one with the other and the said engine compartment comprising a heat engine and fuel therefor comprising liquid hydrocarbon and a combustion supporting medium, means for admitting atmospheric air to said engine, means for controlling the flow of said air, a flask containing a combustion supporting medium, means for controlling the flow of said medium from said flask, and means operable to open the said second controlling means substantially at the instant that the first said controlling means closes.
- 25 18. A submergible vessel comprising a hull, and a disappearing member comprising a hollow shell forming an air duct leading to the interior of the said hull and normally lying outside of the sheathing but recessed inside of the outer periphery of the said hull when inactive and projecting above the same when active.
- 30 19. A submergible vessel comprising a hull, an operator's compartment in the said hull, and a disappearing member comprising a substantially hollow shell comprising a sighting device normally lying uncovered outside of the sheathing but recessed inside of the outer periphery of the said operator's compartment when inactive and projecting above the same when active.
- 35 20. A submergible vessel comprising a hull, an operator's compartment in the said hull, and a disappearing member comprising a periscope lying uncovered and recessed inside the outer periphery of the said operator's compartment when inactive and projecting above the same when active.
- 40 21. A submergible vessel comprising a hull, a recessed portion in the said hull, a sighting device lying in the said recessed portion when inactive, and an operator's compartment mounted below the said recessed portion.
- 45 22. A submergible vessel comprising a hull, a disappearing member comprising a substantially hollow shell, and means comprising a suction device for draining the sea water from the said member.
- 50 23. A submergible vessel comprising a hull, a disappearing air duct, and means for draining the seawater from the said air duct, the said means comprising a pipe leading from the said air duct to a motor within the said hull.
- 55 24. A submergible vessel comprising a hull, a hollow shell comprising an air duct, and a sighting device mounted within the said shell.
- 60 25. A submergible vessel comprising a hull, a pivotable hollow shell comprising an air duct, and a sighting device mounted within the said shell.
- 65 26. A submergible vessel comprising a hull, a sectional hollow shell comprising an air duct, and a sighting device mounted within the said shell.
- 70 27. A submergible vessel comprising a hull, a disappearing hollow shell comprising an air duct, and a sighting device mounted within the said shell.
- 75 28. A submergible vessel comprising a hull, a disappearing pivotable hollow shell comprising an air duct, and a sighting device mounted within the said shell.
- 80 29. A submergible vessel comprising a hull, a hollow shell comprising an air duct, and a periscope mounted within the said shell.
- 85 30. A submergible vessel comprising a hull, a disappearing pivotable hollow shell of stream line form with its greatest width forward of its transverse center line comprising an air duct, and a periscope mounted in the forward part of the said shell.
- 90 31. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding the operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.
- 95 32. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a plurality of bulkheads dividing the said hull into a projectile compartment in the forward part thereof, an operator's com-
- 100
- 105
- 110
- 115
- 120
- 125
- 130

partment amidships, and an engine compartment aft.

33. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a plurality of bulkheads dividing the said hull into a projectile compartment in the forward part thereof, an operator's compartment amidships, and an engine compartment aft, and closable openings for each of the said compartments.

34. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a door in the forward portion of the said compartment, means for firing the said projectile from out of the said compartment through the said door, a compartment for holding an operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.

35. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a plurality of projectiles with individual firing tubes and outer doors one above the other, a compartment for holding an operator, a compartment for holding an engine, the said compartments being in alinement one with the other.

36. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a large projectile and smaller projectiles each of the same having its individual firing tube and outer door, a compartment for holding an operator, a sighting device for the operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.

37. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, horizontal and vertical sight for the operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.

38. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a disappearing sighting member, and a compartment for holding an engine, the said compartments being in alinement one with the other.

39. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein,

a compartment in the said hull for holding a projectile, a compartment for holding an operator, a disappearing pivotable sighting member, and a compartment for holding an engine, the said compartments being in alinement one with the other.

40. A torpedo comprising a hull, a projectile compartment in the forward part of the said hull, an operator's compartment amidships, an engine compartment aft, and a disappearing pivotable sighting device lying with its component parts assembled below the periphery of the said operator's compartment when inactive and projecting above the same when active.

41. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a disappearing sighting member mounted outside the sheathing but recessed within the outer periphery of the said hull, and a compartment for holding an engine, the said compartments being in alinement one with the other.

42. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a resting place for the operator mounted parallel to the longitudinal center line of the vessel and adapted to hold the operator in a prone position, and a compartment for holding an engine, the said compartments being in alinement one with the other.

43. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine comprising a gasolene engine and fuel therefor, the said compartments being in alinement one with the other.

44. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, and a compartment for holding an engine, the said compartments being in alinement one with the other, the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, the said air being either atmospheric air conducted through a tube extending outside the said hull and above the seawater or air from a compressed air tank inside the said hull.

45. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a

compartment for holding an engine, the said compartments being in alinement one with the other and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, and means to open the said second mentioned valve substantially at the instant that the said first mentioned valve closes.

46. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the said compartments being in alinement one with the other and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, and automatic means to open the said second mentioned valve substantially at the instant that the said first mentioned valve closes.

47. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine, the three compartments being in alinement one with the other, and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, means when the said first mentioned valve closes to open the said second mentioned valve, and means when the said second mentioned valve re-opens to close the said second mentioned valve.

48. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine, the three compartments being in alinement one with the other and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air under pressure, a valve in the said tank, automatic means when the first mentioned valve closes to open the said second mentioned valve, and automatic means when the first mentioned

valve re-opens to close the said second mentioned valve.

49. A torpedo comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the said compartments being in alinement one with the other and the said engine compartment comprising a gasolene engine and fuel therefor comprising gasolene oil and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a compressed air tank, a valve therein, and means for holding the said first mentioned valve open, the said means permitting the waves to close the said first mentioned valve and thereby opening the said second mentioned valve.

50. A torpedo comprising a hull, and a disappearing member having a streamline form with its greatest width forward of its transverse center line lying below the periphery of the said hull when inactive and projecting above the same when active, means for holding the said member in its inactive position, and means for holding the same in its active position, the said means also lying below the periphery of the said hull.

51. A torpedo comprising a hull, and a disappearing member having a stream line form with its greatest width forward of its transverse center line lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active, means for holding the said member in its inactive position, and means for holding the same in its active position, the said means also lying below the periphery of the said hull.

52. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a substantially hollow shell lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active.

53. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing and pivotable member comprising a substantially hollow shell lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active.

54. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a disappearing member comprising a hollow shell forming an air duct leading to the interior of the said hull and lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active, and a valve at one end of the said hollow shell.

55. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a substantially hollow shell having a revoluble member lying parallel with the axis of the said hull and lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active. 70
56. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a substantially hollow shell comprising a sighting device lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active. 80
57. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing pivotable member comprising a substantially hollow shell comprising a sighting device and lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active. 85
58. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, an operator's compartment, and a disappearing sectional member comprising a substantially hollow shell comprising a periscope and lying below the outer periphery of the said compartment when inactive and projecting above the same when active. 90
59. A submergible vessels comprising a hull of such small cross section that the operator must necessarily lie prone therein, an operator's compartment, and a disappearing member normally lying outside of the sheathing but recessed inside of the outer periphery of the said hull, when inactive and projecting above the same when active. 100
60. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a hollow shell forming an air duct leading to the interior of the said hull and normally lying outside of the sheathing but recessed inside of the outer periphery of the said hull when inactive and projecting above the same when active. 105
61. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a substantially hollow shell comprising a sighting device normally lying outside of the sheathing but recessed inside of the outer periphery of the said hull when inactive and projecting above the same when active. 110
62. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a substantially hollow shell comprising a periscope lying recessed inside the said hull when inactive and projecting above the same when active. 115
63. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a recessed portion in the said hull, a sighting device lying in the said recessed portion when inactive, and an operator's compartment mounted below the said recessed portion. 120
64. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, an operator's compartment, a telephone instrument mounted in the said compartment and wires leading from the said instrument through the said hull and out of the same into the water in the rear of the said hull the said wires being disconnectible at substantially the rearmost portion of the said hull. 125
65. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, a disappearing air duct, and means for draining the seawater from the said air duct, the said means comprising a pipe leading from the said air duct to a motor within the said hull. 130
66. A torpedo comprising a hull, a hollow shell comprising an air duct, and a sighting device mounted within the said shell. 135
67. A torpedo comprising a hull, a pivotable hollow shell comprising an air duct, and a sighting device mounted within the said shell. 140
68. A torpedo comprising a hull, a sectional hollow shell comprising an air duct, and a sighting device mounted within the said shell. 145
69. A torpedo comprising a hull, a disappearing hollow shell comprising an air duct, and a sighting device mounted within the said shell. 150
70. A torpedo comprising a hull, a disappearing pivotable hollow shell comprising an air duct, and a sighting device mounted within the said shell. 155
71. A torpedo comprising a hull, a hollow shell comprising an air duct, and a periscope mounted within the said shell. 160
72. A torpedo comprising a hull, a disappearing pivotable hollow shell of stream line form with its greatest width forward of its transverse center line comprising an air duct, and a periscope mounted in the forward part of the said shell. 165
73. A torpedo comprising a hull, a projectile compartment in the forward part of the said hull, an operator's compartment 170

- amidships, an engine compartment aft, a disappearing sighting device lying with its component parts assembled below the periphery of the said operator's compartment when inactive and projecting above the same when active, a gasolene engine mounted in the said compartment, a tube through which atmospheric air is normally admitted to the said engine, and a sighting device in the said tube.
74. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member normally lying recessed inside the periphery of the said hull when inactive and projecting above the same when active the said recessed portion being of greater depth than width.
75. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a substantially hollow shell closable at both ends, lying inside the periphery of the said hull when inactive and projecting above the same when active.
76. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone therein, and a disappearing member comprising a hollow shell having operative mechanism within the same and lying within the said hull when inactive and projecting above the same when active.
77. A torpedo comprising a hull, an operator's compartment, a couch or support for the operator to lie upon in a semiupright position, and means for holding back the head of the operator.
78. A torpedo comprising a hull, an operator's compartment, a couch or support for the operator to lie upon in a semiupright position, and means for holding back the head of the operator comprising an adjustable strap fastened to the said hull and above the operator.
79. A submergible vessel comprising a hull having a projectionless exterior except its extended sighting device.
80. A submergible vessel comprising a hull having an exterior without vertical projections above the outer periphery of the said hull except its extended air duct.
81. A submergible vessel comprising a hull having an exterior without vertical projections above the outer periphery of the said hull except its extended sighting device and air duct.
82. A submergible vessel comprising a hull having an exterior without vertical projections above the outer periphery of the said hull except its extended-sighting device and air duct combined in a unitary structure.
83. A submergible vessel comprising a hull adapted to fit in a torpedo tube of similar shape and to be expelled therefrom, a compartment in said hull for holding a projectile, a compartment for holding an operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.
84. A submergible vessel comprising a fusiform hull of such small diameter that the operator must necessarily lie prone, a compartment in said hull for holding a projectile, a compartment for holding an operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.
85. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine, the said compartments being in alinement one with the other and the said engine compartment comprising a heat engine and fuel therefor comprising a liquid hydrocarbon and a combustion supporting medium, means by which atmospheric air is normally admitted to the engine, means for controlling the admission of said air, a tank containing compressed air or its equivalent, means for controlling the flow of same from said tank, and means for automatically opening the said second mentioned controlling means substantially at the instant that the said first mentioned controlling means closes.
86. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the three compartments being in alinement one with the other and the said engine compartment comprising a heat engine and fuel therefor comprising a liquid hydrocarbon, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air or its equivalent under pressure, a valve in the said tank, means when the first mentioned valve closes to open the said second mentioned valve, and means comprising connections leading from one valve to the other when the first mentioned valve re-opens to close the said second mentioned valve.
87. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the three compartments being in alinement one with the other and the said engine compartment comprising a heat engine and fuel therefor comprising a liquid hydrocarbon, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air or its equivalent under pressure,

a valve in the said tank, automatic means when the said first mentioned valve closes to open the said second mentioned valve, and automatic means comprising connections leading from one valve to the other when the said first mentioned valve re-opens to close the said second mentioned valve.

88. A submergible vessel comprising a hull closely enveloping an operator's body lying substantially parallel to the axis of the said hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.

89. A submergible vessel comprising an elongated cylindrically shaped hull of substantially uniform diameter smooth exterior and tapering ends, a compartment in the said hull for holding a projectile, a compartment for holding an operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.

90. A submergible vessel comprising a hull, an air duct mounted on the said hull, a valve in the said duct, and means for keeping the said valve in its open position the said means permitting the waves to close the said valve.

91. A submergible vessel comprising a hull, an air duct mounted on the said hull, a valve in the said duct, means for keeping the said valve open the said means permitting the waves to close the said valve momentarily, and means for closing the said valve permanently.

92. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the said compartments being in alinement one with the other and the said engine compartments comprising an engine and fuel therefor comprising a liquid hydrocarbon and air, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air or the like under pressure, a valve in the said tank, and automatic means to open the said second mentioned valve substantially at the instant that the said first mentioned valve closes.

93. A submergible vessel comprising a hull, a member comprising a substantially hollow shell projecting beyond the periphery of the said hull, a pivotable valve in the upper portion of the said shell, means for holding the said valve open, the said means permitting the waves to close the same, the said valve comprising a top and overhanging side portions.

94. A submergible vessel comprising a

hull, a member comprising a substantially hollow shell projecting beyond the periphery of the said hull, a valve in the upper part of the said shell, and means for opening the said valve the said means permitting the said valve to close, a compressed air tank or the like, a valve in the same, automatic means to open the said last mentioned valve, and automatic means when the said last mentioned valve closes to open the said first mentioned valve.

95. A submergible vessel comprising a hull, a projectile compartment carrying a plurality of projectile tubes in the forward portion of the said hull and closely enveloped by the said hull, an operator's compartment amidships, the said hull also closely enveloping the body of the operator, a sighting device delivering sight to the said operator's compartment, an engine compartment aft, an engine in the said engine compartment and also closely enveloped by the said hull, and fuel for the said engine.

96. A submergible vessel comprising a hull closely enveloping an operator's body lying substantially parallel to the axis of the said hull the said axis passing substantially through the body of the operator, a projectile in the said hull through which the said axis also passes, an engine in the said hull through which the said axis also passes, and a sighting device for the operator mounted directly above his body.

97. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine, the three compartments being in alinement one with the other, and the said engine compartment comprising an engine and fuel therefor, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air or the like under pressure, a valve in the said tank, means when the said first mentioned valve closes to open the said second mentioned valve, and means when the said second mentioned valve re-opens to close the said second mentioned valve.

98. A submergible vessel comprising a hull, an operator's compartment in the said hull, and a disappearing member lying substantially flush with the outside periphery of the said compartment and recessed within the same when inactive and projecting above the same when active.

99. A submergible vessel comprising a hull, and a disappearing and pivotable member comprising a substantially hollow shell normally lying below the periphery of the said hull when inactive and projecting above the same when active.

100. A submergible vessel comprising a hull, an operator's compartment in the said hull, and a disappearing and pivotable member comprising a substantially hollow shell normally lying below the periphery of the said compartment when inactive and projecting above the same when active. 5
101. A submergible vessel comprising a hull of such small cross section that the operator must necessarily lie prone, a compartment in the said hull for holding an operator, a compartment for holding an engine, the three compartments being in alignment one with the other and the said engine compartment comprising an engine and fuel therefor, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a tank containing air or the like under pressure, a valve in the said tank, automatic means when the said first mentioned valve closes to open the said second mentioned valve, and automatic means when the said first mentioned valve re-opens to close the said second mentioned valve. 10 15 20 25
102. A torpedo comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a compartment for holding an engine the said engine compartment comprising a heat engine and fuel therefor, a tube through which atmospheric air is normally admitted to the said engine, a valve in the said tube, a compressed air tank, a valve therein, and means for holding the said first mentioned valve open, the said means permitting the water to close the said first valve and thereby opening the said second mentioned valve. 30 35 40
103. A torpedo comprising a hull, a projectile compartment in the forward part of the said hull, an operator's compartment amidships, an engine compartment aft, a disappearing sighting device lying with its component parts assembled below the periphery of the said operator's compartment when inactive and projecting above the same when active, an engine mounted in the said compartment, a tube through which atmospheric air is normally admitted to the said engine, and said sighting device in the said tube. 45 50
104. A submergible vessel comprising a hull, a member comprising a substantially hollow shell projecting beyond the periphery of the said hull, a valve in the upper part of the said shell, and means for opening the said valve the said means permitting the said valve to close, a tank for compressed air or the like, a valve in the same, automatic means to open the said last mentioned valve, and automatic means when the said second mentioned valve closes to open the said first mentioned valve. 55 60 65
105. A submergible vessel comprising a fusiform hull of such small diameter that the operator must necessarily lie substantially prone, an operator's compartment, a couch or support for the operator to lie upon in a semi-prone position, and means for holding back the head of the operator. 70
106. A submergible vessel comprising a fusiform hull of such small diameter that the operator must necessarily lie substantially prone, an operator's compartment, a couch or support for the operator to lie upon in a semi-prone position, and means for holding back the head of the operator comprising an adjustable strap fastened to the said hull and above the operator. 75 80
107. A submergible vessel comprising an elongated cylindrically shaped hull of substantially uniform diameter and with tapering ends closely enveloping the body of an operator and of such small diameter that he must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding the operator, and a compartment for holding an engine, the said compartments being in alinement one with the other. 85 90
108. A submergible vessel comprising an elongated cylindrically shaped hull of substantially uniform diameter smooth exterior and with tapering ends adapted to fit in a similarly shaped torpedo tube and be expelled therefrom the said hull closely enveloping the body of the operator and of such small diameter that he must necessarily lie prone therein, a compartment in the said hull for holding a projectile, a compartment for holding the operator, and a compartment for holding an engine, the said compartments being in alinement one with the other. 95 100 105
109. A submergible vessel comprising a hull, and a disappearing sectional member comprising a substantially hollow shell lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active. 110
110. A submergible vessel comprising a hull, and a disappearing sectional member comprising a substantially hollow shell comprising an air duct lying with its component parts assembled below the periphery of the said hull when inactive and projecting above the same when active. 115
111. A submergible vessel comprising a hull, a disappearing sectional member comprising a substantially hollow shell comprising an air duct lying below the periphery of the said hull when inactive and projecting above the same when active, and a valve in the said air duct. 120 125
112. A submergible vessel comprising an elongated cylindrically shaped hull of substantially uniform diameter and tapering ends and without vertical projections above 130



the outer periphery of the said hull except its extended sighting device, a compartment in the said hull for holding a projectile, a compartment for holding an operator, and a compartment for holding an engine, the said compartment being in alinement one with the other.

113. A submergible vessel comprising an elongated cylindrically shaped hull of substantially uniform diameter and tapering ends and without vertical projections above the outer periphery of the said hull except its extended sighting device and air duct,

a compartment in the said hull for holding a projectile, a compartment for holding an operator, and a compartment for holding an engine, the said compartments being in alinement one with the other.

114. A submergible vessel comprising a hull, a compartment in the said hull for holding a projectile, a compartment for holding an operator, a disappearing pivotable sighting member, and a compartment for holding an engine the said compartments being in alinement one with the other.

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