G. P. HELFRICH.

TORPEDO.

APPLICATION FILED JULY 20, 1914.

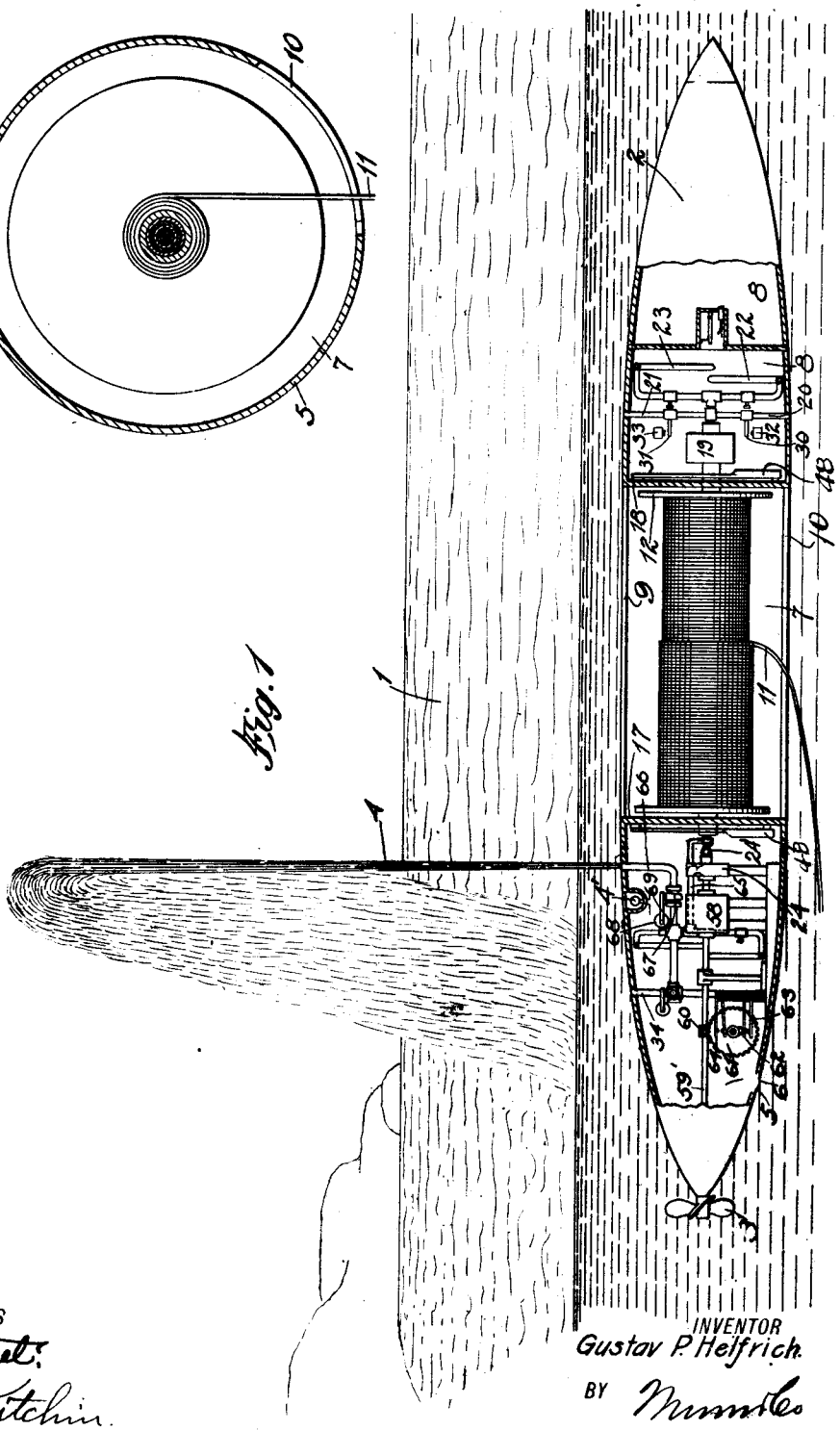
1,133,282.

Patented Mar. 30, 1915.

4 SHEETS—SHEET 1.

Fig. 13

Fig. 1



WITNESSES

F. D. Sweet.

A. L. Kitchin.

INVENTOR

Gustav P. Helfrich.

BY Munn & Co.

ATTORNEYS

G. P. HELFRICH.

TORPEDO.

APPLICATION FILED JULY 20, 1914.

1,133,282.

Patented Mar. 30, 1915.

4 SHEETS—SHEET 2.

Fig. 2.

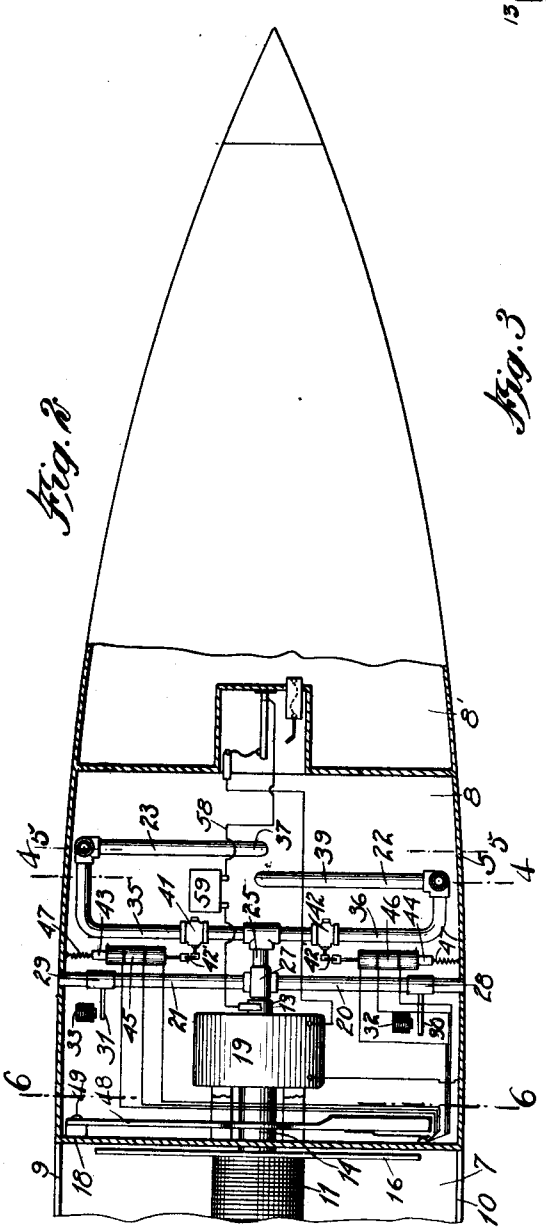
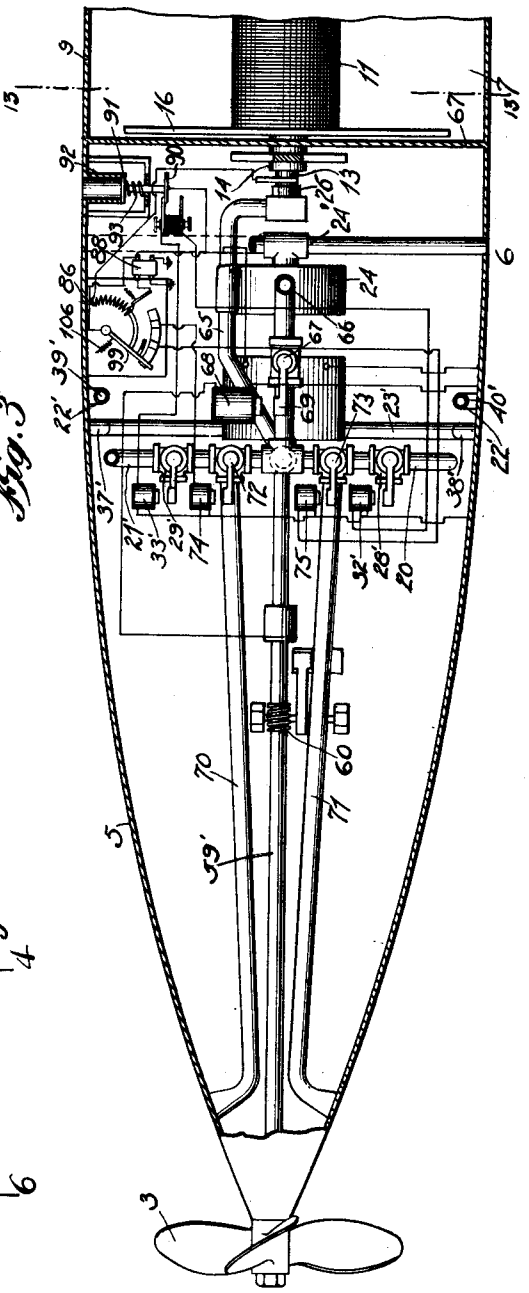


Fig. 3.



WITNESSES

F. A. Sweet

A. L. Kitchin

INVENTOR

Gustav P. Helfrich

BY Munn & Co.

ATTORNEYS

G. P. HELFRICH.

TORPEDO.

APPLICATION FILED JULY 20, 1914.

1,133,282.

Patented Mar. 30, 1915.

4 SHEETS—SHEET 3.

Fig. 12

Fig. 5

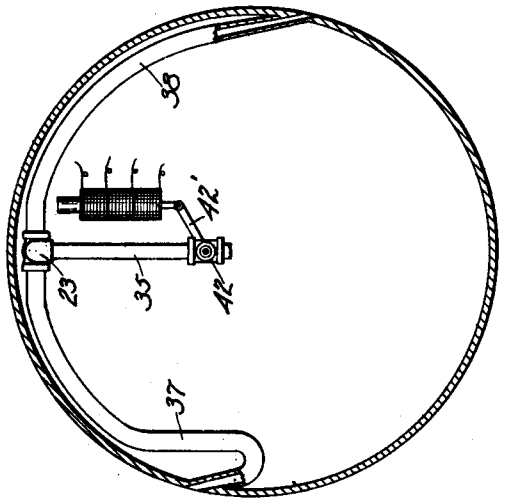


Fig. 7

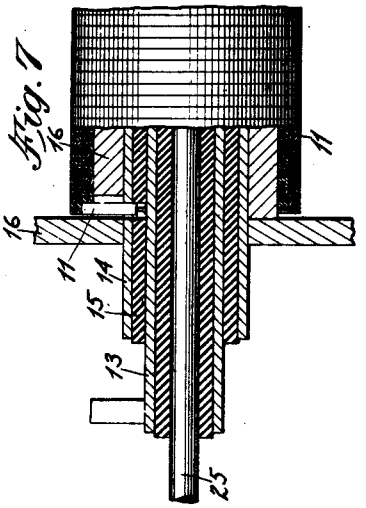


Fig. 4

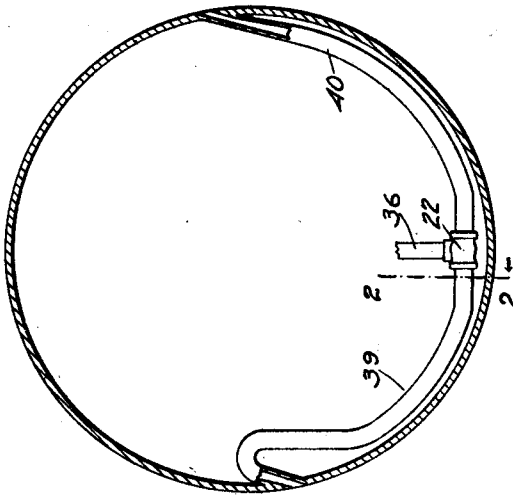
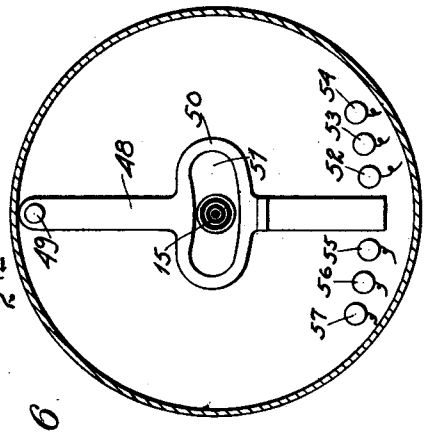


Fig. 6



WITNESSES

F. D. Smart

A. L. Kitchin

INVENTOR

Gustav P. Helfrich.

BY Munn & Co.

ATTORNEYS

G. P. HELFRICH.

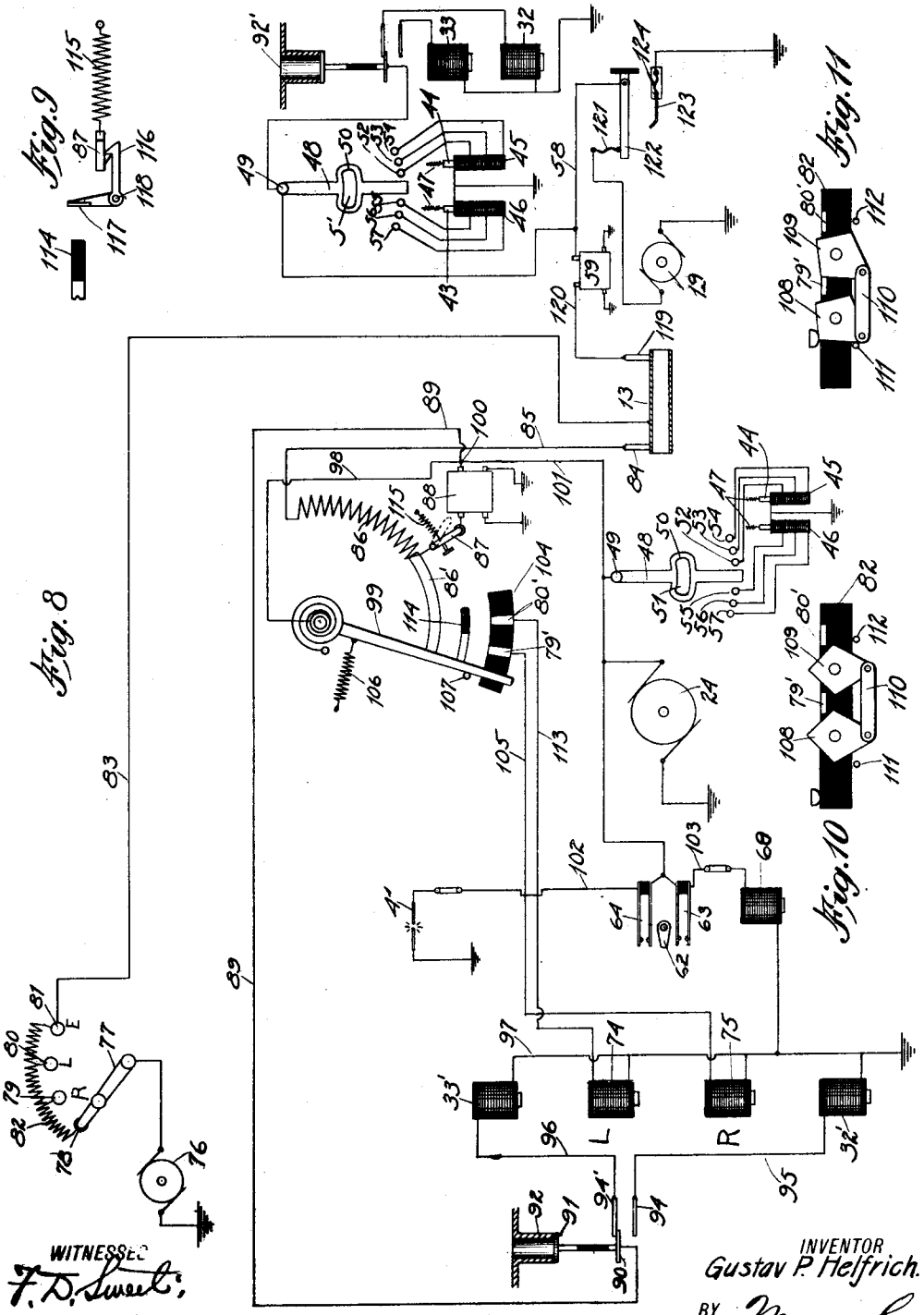
TORPEDO.

APPLICATION FILED JULY 20, 1914.

1,133,282.

Patented Mar. 30, 1915.

4 SHEETS—SHEET 4.



WITNESSES:

F. D. Sweet.

A. L. Kitchin

INVENTOR

Gustav P. Helfrich.

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

GUSTAV P. HELFRICH, OF NEW YORK, N. Y.

TORPEDO.

1,133,282. Specification of Letters Patent. Patented Mar. 30, 1915.

Application filed July 20, 1914. Serial No. 851,930.

To all whom it may concern:

Be it known that I, GUSTAV P. HELFRICH, a citizen of the United States, and a resident of the city of New York, in the county of the Bronx and State of New York, have invented a new and Improved Torpedo, of which the following is a full, clear, and exact description.

This invention relates to improvements in torpedoes, and has for an object to provide an improved construction which will give a visual sign as the same passes through the water whereby the course of the torpedo may be easily followed.

Another object of the invention is to provide an improved construction of propelling and controlling means which may be adjusted so as to force the propeller forward and at the same time cause the same to move on an even balance notwithstanding the pull of a wire connected therewith.

A further object of the invention is to provide an improved construction of torpedo which is provided with a drum carrying electric conductor supplied with current from the shore or vessel, the same being associated with propelling and steering means as well as with a fuse for igniting the explosive matter arranged at a predetermined point in the shell so that power may be applied to the various parts enumerated for causing each one to function as necessary.

A still further object of the invention is to provide an improved torpedo which is propelled by power from the shore and controlled by the amount of current supplied, thus allowing the torpedo to be steered from the shore and to be exploded at any time regardless of the speed of the torpedo and its depth or direction of movement.

In the accompanying drawings—Figure 1 is a longitudinal vertical section through the principal parts of the torpedo embodying the invention, the same being shown arranged in a body of water; Fig. 2 is a longitudinal vertical section through the front of the torpedo, the same being taken approximately on line 2—2 of Figs. 4 and 5; Fig. 3 is a fragmentary horizontal sectional view of the rear part of the torpedo; Fig. 4 is a section through Fig. 2 approximately on line 4—4 on an enlarged scale; Fig. 5 is a sectional view through Fig. 2 on line 5—5 on an enlarged scale; Fig. 6 is a sectional view through Fig. 2 on line 6—6; Fig. 7 is a fragmentary longitudinal sectional view through one end of the conductor carrying spool embodying certain features of the invention; Fig. 8 is a diagram showing the various working parts of the wire connections; Fig. 9 is a detailed fragmentary side view of a switch catch embodying certain features of the invention; Fig. 10 is a detailed side view of a jump over mechanism; Fig. 11 is a view similar to Fig. 10 but with the parts shown in new position; Fig. 12 is an enlarged detailed sectional view through the conductor on the spool shown in Fig. 7; Fig. 13 is a sectional view through Fig. 3 approximately on line 13—13.

Referring to the accompanying drawings by numerals, 1 indicates a body of water and 2 the torpedo as a whole. The torpedo 2 is provided with a propeller 3 of any desired kind. As shown in Fig. 1, means are provided in the torpedo 2 for forcing a jet of water 4 upwardly to an appreciable distance above the surface of the body of water 1 whereby the progress of the torpedo may be observed at any time. This stream of water may be continuous or may be intermediate as desired, and may fall toward the rear or the front of the torpedo according to the speed of the torpedo and the wind.

In forming the torpedo 2 the same is provided with a shell 5, which shell is divided into a rear compartment 6, a middle or center compartment 7, and a forward compartment 8. The compartments 6 and 8 are watertight and contain the various machinery necessary to cause a proper operation of the torpedo. The compartment 7, as more clearly shown in Figs. 1 and 13, is provided with a slot 9 at or near the upper part of the torpedo, and a slot 10 adjacent the lower part of the torpedo, the slot 10 providing an outlet for the square conductor 11. The conductor 11 is wound upon the spool 12 and is connected with the various devices hereinafter described as shown in Fig. 7, namely, through the wire being electrically secured to the tube or sleeve 13 which is formed of metal. It will be observed that the wire 11 passes through the metallic tube 14 and through the insulation 15, the contact of these parts being so tight as to prevent any water passing along the walls of the wire 11 or the end 16 of the spool. In this way current is conducted from the shore to the various current receiving devices in the compartments 6 and 8. Arranged on the tubular member 14 is a covering or sur-

rounding member 16 formed preferably of wood on which the wire 11 is wound. The tubular member 14 is designed to extend through the walls 17 and 18 into the chambers 6 and 8, respectively, the walls and the tubular member 14 being provided with any suitable form of packing for making the connections watertight, but allowing a rotation of the tubular member. The wire 11 is designed to be fed out through the slot 10 as the torpedo moves through the water, one end connected with a suitable source of current supply on the shore and the other end connected to the tubular member 13 shown in Fig. 7 as just described. As it is designed to cause the torpedo to travel considerable distances there will be a comparatively large amount of wire wound on spool 12 and the weight of the wire will be considerable. In order to assist the strain on the wire in turning the spool a motor 19 is provided, which motor is connected with the tubular member 14, whereby when the motor is moved the same will move the spool or tend to move the spool. Preferably the motor is of sufficient strength to not quite rotate the spool whereby a small pull on the wire will cause the spool to rotate and also the spool will rotate more freely after the same has once been started. One side of the motor is connected with the supply of current and the other side is connected with the casing, which casing of course acts as a ground for the return of current to the source of supply.

The motor 19 is arranged in the front compartment 8 and also several other parts which tend to cause a proper operation of the torpedo. The depth regulating pipes 20 and 21 are arranged in compartment 8, and also the balancing members 22 and 23 are arranged in compartment 8. The pipes 20 and 21 receive their supply of water from the pump 24 in the rear compartment 6, the water passing through the tubular member 25. The pipe 25 is connected to pump 24 through any kind of a slip connection arranged in the packing box 26. There is also a slip connection of any suitable kind between the pipe 27 and pipe 25 at the front of the torpedo. The pipes 20 and 21 are connected with pipe 27 and are supplied with water under pressure continually, which water cannot escape, however, until valves 28 and 29 are open. The valves 28 and 29 are preferably larger than the valves 28′ and 29′ so that a slightly more powerful discharge of water will be had at the front than the rear, whereby the torpedo may point slightly upward or slightly downward, in addition to being bodily moved upwardly and downwardly. These valves may be of any suitable type, and are provided with operating handles 30 and 31 which are of magnetizable material so that they may be attracted by the magnets 32 and 33, respectively, whereupon the valves will be opened. It is of course understood that only one of the magnets are energized at a time so as to cause an elevation or depression of the torpedo. In the rear compartment 6 is arranged a pipe 34 which is provided with valves 28′ and 29′ which operate in a similar manner to valves 28 and 29 by reason of magnets 32′ and 33′ forming armatures 30′ and 31′, which armatures are the operating handles of the valves.

In arranging the wiring for the magnets 32′ and 33′ the same may be associated with the rear plunger 92 in a similar manner to the way the magnets 32 and 33 are arranged with the plunger 92′ in compartment 8 at the front of the torpedo. By this construction and arrangement the valves 28 and 28′ will open simultaneously for forcing the torpedo upwardly, and valves 29 and 29′ will open simultaneously for forcing the torpedo downwardly bodily. The movement of the torpedo is in a bodily downward or upward direction though the tendency is for the torpedo to point slightly upwardly or downwardly according to the up or down movement desired by reason of the size of the valves above mentioned. As the extra pressure is in the front the front is always elevated or depressed slightly which is not objectionable though such movement would be objectionable at the rear, but being at the front will only cause the torpedo to rise more quickly or sink more quickly than otherwise. The water in regulating the depth of the torpedo is discharged at the upper and lower surfaces of the torpedo so that the torpedo is properly raised or lowered but is not forced to one side so that it may move upwardly and downwardly without in any way varying a straight course through the objective.

Connected with the pipe 27 are pipes 35 and 36. Pipe 35 has connected therewith discharge pipes 37 and 38, which pipe 36 has discharge pipes 39 and 40, as clearly shown in Figs. 4 and 5. This construction is designed to balance the torpedo and prevent rolling to any considerable extent. When water is discharged through pipes 39 and 40, for instance, the same tends to roll the torpedo in one direction, namely, to the right when looking at Fig. 4, which would counterbalance any tendency of the torpedo to roll of its own motion to the left. The structure shown in Fig. 5 operates in a reverse or opposite direction. In order that these discharge pipes 37 to 40, inclusive, may be provided with water under pressure at the proper time valves 41 and 42 are provided, which valves may be of any desired construction. Each of the valves is pro-

vided with an arm 42′ (Fig. 5) which arms are connected to the cores 43 and 44, respectively, which operate in solenoids 45 and 46. Each of the solenoids 45 and 46 is formed with a plurality of independent coils, that shown in the drawing being three for each solenoid whereby there are three steps of progress for the cores 43 and 44. A spring 47 is provided for each core for retracting the same when the respective coils are demagnetized. When the first coil is magnetized in either of the solenoids the core will be moved a certain distance which will open one of the valves a predetermined distance. As the other coils are magnetized the valve is opened to a greater extent. The energizing of the various coils is caused by the rolling of the torpedo. In order to switch on current to the various coils successively, a gravity actuated switch mechanism is provided as shown in Fig. 6. Referring to this figure it will be seen that a pendulum 48 is pivotally mounted at 49 in the casing, said pendulum being formed with an enlargement 50 having an arc-shaped slot 51 for accommodating the tube 14 and associated parts, which tube limits the swinging movement of the pendulum 48. The lower end of pendulum 48 is designed to contact successively with the various contact members 52, 53, 54 or with the contact members 55, 56 and 57, according to the direction of rolling of the torpedo. The contact members 55, 56 and 57 are in circuit with the respective coils of solenoid 46, while the contacts 52, 53 and 54 are in circuit with the coils of the solenoid 45. The coils are grounded on one side, and on the other side are connected to the contacts just mentioned, which contacts are connected with the supply wire 58 which leads from the transformer 59. Preferably the current fed into the transformer is of high tension, and is stepped down so that the supply wire 58 will be supplied with current at comparatively low tension, as for instance 110 volts, though any other desired voltage may be used without departing from the spirit of the invention. It will be observed that by the use of the pendulum 48 the torpedo is maintained substantially in a horizontal plane automatically. In order that the torpedo may be positively maintained in a horizontal plane there is arranged at the rear of the torpedo pipes 37′ and 38′, and also pipes 39′ and 40′, which pipes are similar to the pipes shown in Figs. 4 and 5, and which operate in a similar manner so that no additional description thereof is thought necessary. Water is discharged out of these pipes simultaneously with the discharge of water out of the pipes at the front so that the torpedo is well balanced at all times. Arranged in the rear compartment 6 in addition to the mechanism just described is a motor 58 which is connected with the shaft 59′ carrying the propeller 3.

The shaft 59′ carries a worm 60 which meshes with the worm wheel 61, which wheel in turn rotates a cam 62 designed to close the respective contacts 63 and 64 hereinafter more fully described. It will be observed from Fig. 1 that the pump 24 is connected to the various water dispensing pipes by a connecting pipe 65 so that there will be a continual water pressure in all these pipes whereby the water may be instantly discharged when any of the valves are opened. A water jet pipe 66 is in communication with the pipe 65 so that a jet 4 may be provided at any time. A valve 67 is interposed in pipe 66, which valve is operated by a magnet 68, said magnet attracting the armature 69, which armature comprises the operating member of the valve. This valve may be of any desired construction, as for instance a spring valve which will normally remain closed and is only opened when the magnet 68 is energized. This valve is of the same type as the various other valves heretofore mentioned, namely, valves 32 and 33 and 32′ and 33′. In order to provide means for steering the torpedo either to the right or left rear discharge pipes 70 and 71 (Fig. 3) are provided which are connected through suitable piping to the pump 24. Interposed at any desired point are valves 72 and 73 formed similar to valve 67 and operated by magnets 74 and 75, that is, they are opened by these magnets when the magnets are energized and are automatically closed. When valve 72 is opened the same causes the torpedo to turn to the left, and when the valve 73 is opened water is discharged through pipe 71, and turns the torpedo to the right.

By using the various constructions and arrangements as above described means are provided which will propel the torpedo forward and which will automatically keep the same on an even keel as well as automatically maintain the same at a certain depth beneath the surface of the water. Manually controlled means are provided for steering the device, and for finally causing the explosion of the explosive mixture in compartment 8′. In order to see or rather note the path followed by the torpedo a water jet 4 is provided, and also a light 4′. The magnet 68 controlling the water jet 4 is connected with contact 63, while the light 4′ is connected with the contacts 64 whereby as cam 62 rotates the water jet and light will be intermittently used. It will be observed that by the use of the worm 60 and the worm wheel 61, to which the cam 62 is rigidly secured, the movement of the cam is slow in comparison to the propeller 3 so that there will be an appreciable time between the jets

of water and the flashes of light. This ratio of speed may be varied to any desired extent without departing from the spirit of the invention.

In order that the operation of the various parts may be more clearly seen and the way in which the power is supplied thereto, a complete diagram of the various parts is shown in Fig. 8 to which reference is now made. Arranged on the shore is a source of current 76 which may be of any desired kind, as for instance a dynamo with one side grounded and the other side connected with switch 77. The switch 77 is designed to contact respectively with the contact points 78, 79, 80 and 81, which contact points are connected by resistance. When it is desired to start the torpedo toward an object the same is placed in the water and pointed toward the object, after which the switch 77 is moved to the position shown in Fig. 8. This will supply current whereby the ship is propelled, maintained on a proper keel and maintained at a predetermined depth. When the switch is in this position current will also be supplied for providing a light and to the water jet 4. When it is desired to turn the torpedo to the right the switch is moved over to contact 79 until the turn has been accomplished and is then moved back to contact 79. If it is desired to change the direction of the torpedo so that it will be traveling toward the left switch 77 is quickly moved over to contact 80 and maintained on contact 80 until the new direction has been attained, after which it is moved back to contact 78. When the switch is in engagement with contact 78 as shown in Fig. 8, current will pass from the dynamo 76 to switch 77, contact 78, through the various coils of resistance 82, wire 83, tubular member or sleeve 13, brush 84, wire 85, solenoid 86, switch 87, one of the windings of the step down transformer 88, and from thence to the ground.

On the drawings the secondaries to the respective transformers have been grounded but it will be evident that a common return wire could be provided and connected to the various devices in the torpedo, being supplied with current from the transformer. When current is traveling in this path a secondary current will be supplied to wire 89, and will flow through wire 89 to a switch member 90 connected to a plunger 91. Plunger 91 is arranged in a sleeve 92, and has the outer end in free communication with the water surrounding the torpedo. When the depth of the torpedo becomes too great the water will push inwardly the plunger 91 against the action of spring 93 until the switch member 90 contacts with the contact plate 94, whereupon current will pass from wire 89 to contact plate 94, wire 95, magnets 32 and 32′ and from thence to the ground, the transformer 88 being grounded on one side. When the magnets 32 and 32′ are energized water is caused to flow through valves 28 and 28′, whereupon the torpedo is raised. As soon as the torpedo is raised to the desired extent the pressure on the plunger 91 will be decreased to such an extent as to allow spring 93 to partially overcome the action of the water, whereupon the switch member 90 will be arranged out of contact with contact plates 94 and 94′. As long as the torpedo stays at the proper depth the switch member 90 will not contact with either of the plates 94 or 94′, but if the torpedo should raise to a position near the surface, spring 93 will push the plunger 91 outwardly as shown in Fig. 8, whereupon the switch member 90 will engage the contact plate 94′. When this occurs current will flow from the switch member 90 to plate 94′, wire 96, magnets 33 and 33′, and from thence through wire 97 to the ground. This will cause the proper valves to be opened for discharging the water upwardly, whereupon the torpedo will be forced downwardly until switch member 90 is moved out of contact with plate 94′. In addition to charging wire 89 current will pass to wire 98 and from thence to switch arm 99. The current in charging wire 88 will divide at 100 and charge wire 101 from which current is taken by pendulum 48, motor 24 and the contact members 63 and 64. When contact 64 is closed current will flow through wire 102 to the lamp 4′, and from thence to the ground. When contacts 63 are closed current will flow through wire 103 to magnet 68, whereupon valve 67 will be opened and water jet 4 will be caused to project upwardly as shown in Fig. 1. By these means power is supplied to the various parts for causing a proper operation of the propeller with the exception of turning the same to the right or left or exploding the explosive matter in compartment 8′. When it is desired to turn the torpedo to the right switch 77 is moved over to contact 79 temporarily and then moved back to contact 78. It is to be understood that the switch 77 and contacts associated therewith are on the shore and manually operated. When the switch 77 is in engagement with contact 79, one of the resistance coils is cut out, whereupon an increase of current will be provided and this increase of current will energize the solenoid 86 in the rear compartment of the torpedo, the energization being such as to attract a core 86′ until the arm 99 engages contact 79′ on the segment 104, which segment is formed of insulating material. When the arm 99 is in contact with the contact member 79′ current will flow in the circuits heretofore described in the usual manner, and in addition current will flow through wire 98, arm 99, contact 79′, wire

105, magnet 75 and from thence to the ground. This will cause the valve 73 to be opened. When the torpedo has turned to the desired extent switch 77 is moved back to contact 78, whereupon the core 86′ will be released and the retractile spring 106 will move the arm 99 back against stop 107. When it is desired to turn the torpedo to the left switch 77 is moved quickly over to contact 80 and consequently cuts out more resistance than when moved over to contact 79, whereupon the core 86′ will be attracted until arm 99 is in engagement with the segment 80′. As arm 99 moves over to segment 80′ the same strikes the pivotally mounted members 108 and 109 (Figs. 10 and 11), and thereby skips or jumps over the segment 79′.

The members 108 and 109 are pivotally mounted, and are connected by a link 110 so as to act together, stops 111 and 112 being provided for limiting the swinging movement of these members. When arm 99 is in engagement with segment 80′ current will pass from arm 99 to segment 80′, wire 113, magnet 74, and from thence through wire 97 to the ground, thus causing valve 72 to open and turn the torpedo to the left. When the turning movement has been completed the switch 77 is moved back quickly to the contact 78. This will weaken the magnetism in solenoid 86 sufficiently for allowing spring 106 to overcome the magnetism and move arm 99 back to the position shown in Fig. 8. It will be observed from Fig. 8 that the pendulum 48 is continually supplied with current so that when the same swings current will be supplied to either of the solenoids 45 or 46. It is to be observed from Fig. 1 that there is a pendulum 48 in each of the compartments 6 and 8 so that the water discharged may be controlled at each end of the torpedo.

When it is desired to explode the explosive matter arranged in compartment 8′, which explosive matter may be of any desired kind, the switch 77 is moved over until the same engages the contact 81, whereupon all of the resistances 82 are cut out and the full supply of current is impressed on the wire 83. This large supply of current will energize solenoid 86 and swing arm 99 until the insulated projection 114 strikes the switch holder 17 and thus disconnects the switch, whereupon the spring 115 will draw the contacts apart and cut out the transformer 88. The arrangement of catch associated with spring 115 is shown in Fig. 9, which catch comprises merely a hook 116 having an upstanding arm 117 designed to be engaged by member 114. When member 114 strikes the upstanding member 117, hook 116 swings on its pivot 118 and becomes disengaged from the switch 87. When this occurs all of the mechanism at the rear of the torpedo is deprived of current. However, current passes from wire 83 through the tubular member 13, brush 119, wire 120 to the transformer 59 arranged in compartment 8, and from thence to the ground. From the transformer 59 current is impressed upon the wire 58, which current being of greater amperage causes the fuse 121 to blow or be fused, whereby the swinging arm 122 swings down into engagement with the contact member 123. This will switch the current on to the explosive igniting fuse or cap 124, which when fused will ignite the explosive matter in chamber 8′. It will be noted that when the fuse 121 is broken the current is shut off of all of the regularly moving parts, and if the torpedo is at a proper level, and on a proper horizontal keel, no current will flow except through wire 58 as the depth regulator and balancing mechanism are automatically cut out.

From this arrangement of wiring and associated parts, it is to be noted that the torpedo is electrically driven and electrically controlled. It will also be noted that when the torpedo is in the water there is a continuous supply of current which causes the torpedo to be propelled and causes an automatic action whereby various mechanisms properly balance the torpedo, hold the torpedo at a proper level, cause the spool to rotate, provide an intermittent light, and also provide an intermittent jet of water. In addition to these automatically controlled means a manually operated switch is arranged on the shore which controls certain mechanism in the torpedo for turning the torpedo to the right or left for causing the explosion of the explosive matter carried by the torpedo. A construction of this kind presents high efficiency in that it will certainly reach the object intended, or if for any reason it can not reach the object it may be steered so as to come back to the shore and be preserved for a second attempt. The solenoid switching device is preferably placed in a vertical position facing the rear of the torpedo and away from the magnetic field set up by the cable on spool 12.

In connection with the light 4′ it will be evident that any kind of a lamp may be used, as for instance a lamp of the searchlight type where the rays are straightened or concentrated, and thus easily projected through the water.

The pump 24 is designed to continuously rotate so as to always maintain a water pressure in the respective pipes. In order to do this the same is directly coupled with the motor 58. The pump 24 receives water from opposite sides of the shell of the torpedo and through horizontally arranged pipes 24′ and a suitable strainer as shown more clearly in Fig. 3, whereby there will be no tendency given to the torpedo to turn.

As shown in Figs. 1 and 2 a war head is fixed to the point of the torpedo, but it will be evident that this may be either used or not, as desired.

What I claim is:—

1. In a torpedo of the class described, a casing provided with a plurality of compartments, a spool arranged in one of said compartments, said spool being designed to carry a wire, means for supplying current to said wire, means arranged in said casing connected with the wire on said spool for propelling the torpedo, means for supplying a water jet, means for supplying an intermittent light, means for automatically controlling the tossing of the torpedo, and means for turning the torpedo to the right or left according to the amount of current impressed on the wire on said spool.

2. In a device of the character described, means indicating the location of torpedoes comprising an upwardly extending conduit, a pump for forcing water through said conduit so as to provide a jet of water an appreciable distance above the surface of the water in which the torpedo is positioned, means for supplying a light adjacent said jet of water, means for intermittently turning on the jet of water and the light, said means alternately turning on the jet of water and the light, and means on the shore controlling the supply of current to said light and to the means for forcing the water through said conduit.

3. In a device of the character described, means indicating the location of a torpedo comprising an upwardly extending conduit, a continuously operating pump for forcing water through said conduit so as to provide a jet of water an appreciable distance above the surface of the water in which the torpedo is positioned, means arranged on the shore for supplying power to said pump, a propeller for said torpedo, means for rotating said propeller, and means actuated by the propeller shaft for intermittently turning on the water from said pump to said conduit whereby said water jet will be supplied intermittently.

4. In a device of the character described, means indicating the location of torpedoes comprising an upwardly directed conduit, a pump for ejecting fluid from said conduit for providing a jet of water extending an appreciable distance above the water in which the torpedo is positioned so as to serve as a visual marker, means for intermittently turning on the water from said pump to said conduit whereby said water jet will be provided at spaced intervals, a pair of guiding tubes associated with said pump, means controlled from the shore for turning on water from said pump to either of said guiding tubes, a plurality of balancing tubes connected with said pump, automatically actuated means for turning on the water to said balancing tube, depth regulating tubes arranged adjacent each end of the torpedo, and automatically operated means for turning on water from said motor to said depth regulating tubes.

5. In a device of the character described, a torpedo shell, means for dividing said torpedo shell into a plurality of compartments, explosive matter arranged in one of said compartments, a wire carrying drum arranged in the second compartment, propelling and steering means arranged in the third compartment, means arranged at each end of the torpedo for balancing the torpedo so as to hold the same on an even keel, means arranged at each end of the torpedo for automatically regulating the depth of the torpedo, a source of current on the shore, and means on the torpedo connected with said wire and with said source of current for controlling the current supplied to the torpedo through said wire.

6. In a device of the character described, means for indicating the location of torpedoes comprising a conduit extending in an upward direction, a valve arranged in said conduit, a pump for supplying water to said conduit, means for intermittently turning on said valve, means for propelling the torpedo, and means controllable from the shore for steering the torpedo.

7. In a device of the character described, a torpedo shell, a pair of balancing pipes arranged at each end of the shell, a pump for supplying water to all of said pipes, a valve for each of said pipes, means for controlling said valves, said means including a solenoid and core, means for supplying current to said solenoid, a plurality of contacts for controlling the current to said solenoid, and a gravity actuated pendulum designed to engage at different times said contact, whereby when the torpedo shell turns to one side one or more of the contacts on one side will be engaged, and when the torpedo rolls to the other side one or more contacts on the opposite side will be engaged.

8. In a device of the character described, a torpedo shell, means for providing a jet of water for indicating the position of the torpedo and light, means for intermittently and alternately turning on the light and the jet of water, means for automatically regulating the depth of the torpedo, means for automatically holding the torpedo on an even keel continuously, operating means for propelling the torpedo, and means controllable from the shore for steering the torpedo.

9. In a torpedo of the character described, means for propelling the torpedo, means providing a light and a water jet acting as visual signals for indicating the path of travel of the torpedo, means for regulating the depth of the torpedo, and means for

steering the torpedo, a source of current supply arranged on the shore, a wire leading from said source of current supply to the torpedo, means arranged on the torpedo for receiving current from said wire, a switch for controlling the passage of current from said wire, means for automatically opening said switch when an extra supply of current is provided, a fuse arranged at one end of the torpedo, an arm supported by said fuse, a second fuse arranged adjacent said arm, said second mentioned fuse being designed to explode the explosive matter arranged in the torpedo, and means arranged on the shore for increasing the current to a point beyond the capacity of both of said fuses whereby the explosive matter in said torpedo will be exploded.

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

GUSTAV P. HELFRICH.

Witnesses:
A. L. KITCHIN,
G. H. EMSLIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."