Dec. 19, 1922.

1,439,363

J. H. HAMMOND JR.

RECEIVING SYSTEM FOR RADIANT ENERGY,

ORIGINAL FILED DEC. 13, 1919.

2 SHEETS-SHEET 1

Fig. 1

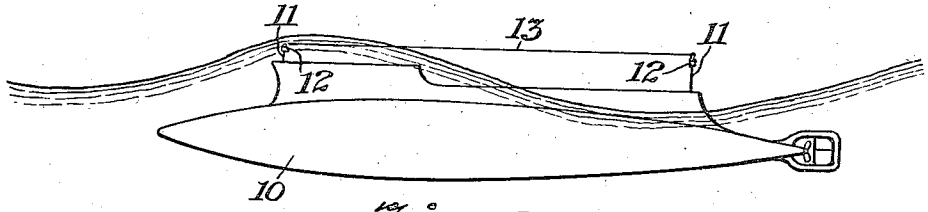
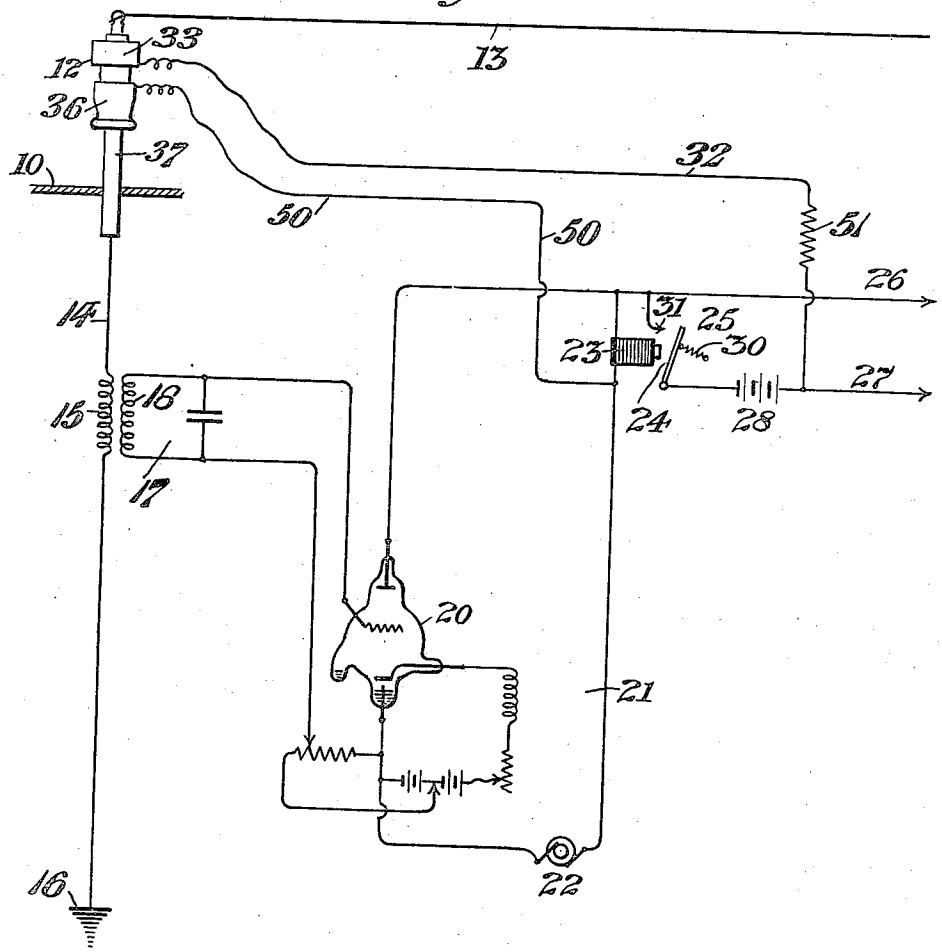


Fig. 2



INVENTOR

John Hayes Hammond Jr.

BY

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ATTORNEY

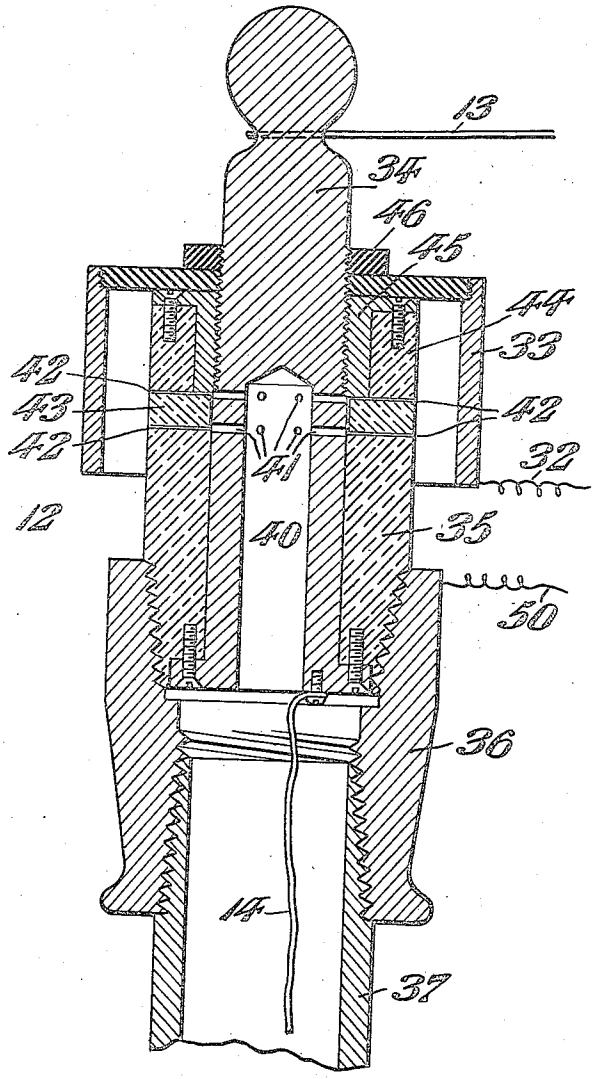
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2 SHEETS-SHEET 2

Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN HAYS HAMMOND, JR., OF GLOUCESTER, MASSACHUSETTS.

RECEIVING SYSTEM FOR RADIANT ENERGY.

Application filed December 13, 1919, Serial No. 344,735. Renewed May 3, 1922. Serial No. 558,203.

To all whom it may concern:

Be it known that I, JOHN HAYS HAMMOND, Jr., a citizen of the United States, and a resident of Gloucester, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Receiving Systems for Radiant Energy, of which the following is a specification.

Some of the objects of the present invention are to provide an insulator for supporting an antenna upon a marine vessel, such as a submarine or submersible torpedo; to provide means controlled by an insulator for short circuiting a signal controlled circuit; to provide means actuated by a wave washing over an antenna support for rendering a controlled circuit inoperative in response to signals transmitted from a distance; to provide means to automatically render a control circuit unresponsive to signals when a wave or water submerges the antenna support, and to restore normal operating conditions when the antenna support is out of contact with the water or wave. When signals are being sent for the operation of the control mechanism for purposes of steering the torpedo or submarine, it has been found that a wave washing over the antenna would break the said signal into two component parts, thus giving the wrong signal for the control mechanism. The purpose of this invention is to ensure a signal being broken into two or more separate signals through the action of waves; and to provide other improvements as will hereinafter appear.

In the accompanying drawings, Fig. 1 represents a side elevation of a marine vessel, equipped with the present antenna invention, partially submerged by a wave; Fig. 2 represents a diagram of the receiving and control circuits; and Fig. 3 represents a sectional elevation of one of the insulators embodying one form of the present invention.

Referring to the drawings, one form of the invention is shown in Fig. 1 as applied to a marine vessel 10, such as a submarine or subsurface torpedo having two masts 11 supporting respectively insulators 12 which serve as terminal supports for an antenna 13. The open aerial circuit includes the antenna 13, a conductor 14, a primary coil 15 and ground 16, the conductor 14 entering the vessel 10 by way of one of the insulators 12 and being inductively coupled to the receiving set.

For receiving signals of radiant energy for controlling the steering of the vessel or other purpose, a receiving set of any suitable type may be employed, this in the present instance consisting of a tuned circuit 17 including a secondary coil 18 inductively coupled to the primary 15 and arranged to control a detector 20 which is here shown as a mercury vapor detector. This detector 20 is also included in a circuit 21 including an alternator 22 and a relay coil 23, the latter having an armature 24 arranged to control a circuit 25 including leads 26 and 27, a battery 28 and any device (not shown) to be operated or controlled by the received signals. Normally the circuit 25 is maintained open by a spring 30 which holds the armature 24 away from a terminal contact 31 of the said circuit 25.

From the foregoing it will be understood that upon the receipt of a predetermined signal the relay coil 23 will be energized and thereby cause the circuit 25 to be closed by the armature 24 engaging the contact 31 and thus actuating the controlled mechanism.

For preventing improper operation of the controlled mechanism caused by water or waves washing over the receiving insulator 12 during the signal receiving intervals a means for short circuiting the controlled mechanism, consisting of a conductor 32 electrically joined at one end to the conductor 27 and at the other end similarly connected to a cap or shield 33 of conducting material which has threaded connection with a supporting stem 34 also of conducting material and upon which the antenna 13 is supported. This stem 34 forms the body of the insulator 12 and carries a sleeve 35 of bakelite or other insulating material which is threaded into a coupling 36 of conducting material fixed to a pipe 37 supported by and leading to the interior of the vessel. The conductor 14 is connected to the stem 34 and passes to the interior of the vessel, it being understood that a suitable insulated joint forms a connection between the pipe 37 and the vessel 10. The stem 34 at its inner end is provided with an axial bore 40 which terminates adjacent a plurality of laterally arranged ports 41 extending through the stem body and in aline-

ment respectively with similar ports 42 formed between the sleeve 35 and an annular member 43 of insulating material, and between the latter and a collar 44 also of insulating material.

The parts are made fast by the provision of a bushing 45 fixed to the collar 44 and in threaded engagement with the stem 34. The cap or shield 33 seats upon the bushing 45 and is held rigid by a lock nut 46 threaded to the stem 34. By this construction the cap 33 is supported in encircling relation with respect to the sleeve 35 being spaced a suitable distance therefrom concentrically and in its adjusted position is also spaced from the conducting coupling 36 so that it forms a terminal of the conductor 32. The coupling 36 forms the other terminal of the shunt circuit since it is connected by a conductor 50 with the conductor 27 on the opposite side of the battery 28 from the conductor 32 and includes the relay coil 23 in the short circuit.

Normally oil is circulated through the pipe 37, the bore 40 and exits by way of ports 41 and 42 in order to cause a thin skin of oil to be constantly maintained around the exterior lower portion of the insulator 12 to prevent electrical leakage.

In the operation of the device under conditions where the insulators 12 are out of contact with the water, the operating signals are freely received and the receiving circuits cause the relay coil 23 to be energized thereby closing the controlled circuit 25 by means of the movable armature 24. In case a wave washes over the receiving insulator 12 the water forms a conductor between the cap 33 and the coupling 36 closing the shunt circuit and thereby short circuiting the control circuit 25 by way of conductors 32 and 50 to maintain the relay coil 23 energized and the armature 24 in closed circuit position.

To prevent burning out of the relay coil 23 when the short circuit is closed, a relatively high resistance 51 is preferably inserted in the conductor 32 to compensate for the extra current thrown upon the relay coil 23.

When the wave subsides and the insulator 12 again projects clear of the water, the short circuit is broken and operating conditions are again restored. Thus it is seen that if a signal is being received and the detector 20 is being energized, and even if the antenna 13 be momentarily grounded through the action of a wave, nevertheless the relay 23 will remain energized as hereinbefore described, thus only one signal will be transmitted along the wires 26 and 27 to cause the operation of the control mechanism. Since B. Van der Pol has measured the conductivity of sea water in relation to high frequency currents such as used in wireless and has found the conductivity to be practically equivalent in value to the conductivity which salt water affords to steady currents, it is obvious that the action of the detector 20 will leave off where the action of the circuit 50 and 51 will begin, thus there should be practically no period of inoperative condition for the relay 23.

Although only one of the many forms in which this invention may be embodied has been shown herein, it is to be understood that the invention is not limited to any specific construction, but might be applied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A receiving system comprising in combination an antenna, a receiving circuit arranged to respond to signals received by said antenna, a control circuit arranged to be actuated by said receiving circuit, a support for said antenna, and means to render said control circuit inoperative when said support is submerged.

2. A receiving system comprising in combination an antenna, a receiving circuit arranged to respond to signals received by said antenna, a control circuit arranged to be actuated by said receiving circuit, a support for said antenna, and means to render said control circuit inoperative when said support is submerged and to restore said control circuit to operative condition when said support projects from the water.

3. A receiving system, comprising in combination, an antenna, a receiving circuit arranged to respond to signals received by said antenna, a control circuit arranged to be actuated by said receiving circuit, a support for said antenna, and means to short circuit said control circuit when said support is submerged.

4. A receiving system, comprising in combination an antenna, a receiving circuit arranged to respond to signals received by said antenna, a control circuit arranged to be actuated by said receiving circuit, a support for said antenna, and means to short circuit said control circuit when said support is submerged and to restore said control circuit to operative condition when said support projects from the water.

5. A receiving system comprising in combination, an antenna, a receiving circuit arranged to respond to signals received by said antenna, a control circuit arranged to be actuated by said receiving circuit, a support for said antenna, and means operated by a wave washing over said support for rendering said control circuit temporarily unresponsive to said receiving circuit.

6. A receiving system comprising in combination, an antenna, a receiving circuit arranged to respond to signals received by

said antenna, a control circuit arranged to be actuated by said receiving circuit, a support for said antenna, and means operated by a wave washing over said support for short circuiting said control circuit while said support is submerged.

7. A receiving system comprising in combination an antenna, a receiving circuit arranged to respond to signals received by said antenna, a control circuit arranged to be actuated by said receiving circuit, a support for said antenna, a shunt circuit for closing said control circuit, and a pair of conductors carried by said support and arranged in spaced relation, said conductors forming respectively terminals for said shunt circuit, whereby said shunt circuit is rendered operative by water washing over said conductors.

8. A receiving system comprising in combination an antenna, a receiving circuit arranged to respond to signals received by said antenna, a relay magnet included in said receiving circuit, a control circuit arranged to be operated by the energization of said relay magnet in response to received signals, a shunt circuit including said relay magnet, and a pair of conductors arranged in spaced relation and supported adjacent said antenna, said conductors forming respectively terminals for said shunt circuit, whereby said shunt circuit operates to energize said relay magnet by water washing over said conductors.

9. A receiving system comprising a control circuit, means operated by signals transmitted from a distance for operating said control circuit, a shunt circuit operatively connected to said control circuit, and a pair of conductors mounted in exposed position upon a vessel and arranged in spaced relation, said conductors forming respectively terminals of said shunt circuit, whereby water washing over said conductors causes said shunt circuit to short circuit said control circuit.

10. The combination of an antenna, a metallic member spaced therefrom, a normally open circuit having opposite terminals connected respectively with the antenna and with said member and arranged to be closed by the simultaneous engagement of a conducting fluid with the antenna and said member.

11. The combination of an antenna, a metallic member spaced therefrom, a normally open circuit having opposite terminals connected respectively with the antenna and with said member and arranged to be closed by the movement of the antenna and said member into a conducting fluid.

12. The combination of an antenna, a metallic member spaced therefrom, a normally open circuit having opposite terminals connected respectively with the antenna and with said member and arranged to be closed by the submersion of said antenna and member.

13. The combination of an antenna, a pair of spaced metallic members so positioned that they may become submerged, an electrical connection between one of said members and the antenna, a normally open circuit having opposite terminals connected respectively with said members and arranged to be closed by the submerging medium.

14. In combination, an antenna, a control circuit arranged to be actuated by radiant energy received through said antenna, and means operable by the submersion of a portion of said antenna for rendering said control circuit inoperable.

15. In combination, an antenna, a control circuit arranged to be actuated by radiant energy received through said antenna, and means operable by the submersion of a portion of said antenna for short circuiting said control circuit.

16. In combination, an antenna, a control circuit arranged to be actuated by radiant energy received through said antenna and means operable upon the submersion of a portion of said antenna for rendering said control circuit inoperable.

17. In combination, a nautical vessel, a pair of spaced metallic members thereon so positioned that they may become submerged in the water which sustains the vessel, a normally open circuit on the vessel connected with said members and arranged to be closed by said water.

In witness whereof I have hereunto set my hand this 24th day of November, 1919.

JOHN HAYS HAMMOND, JR.