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SENDING AND RECEIVING CIRCUIT

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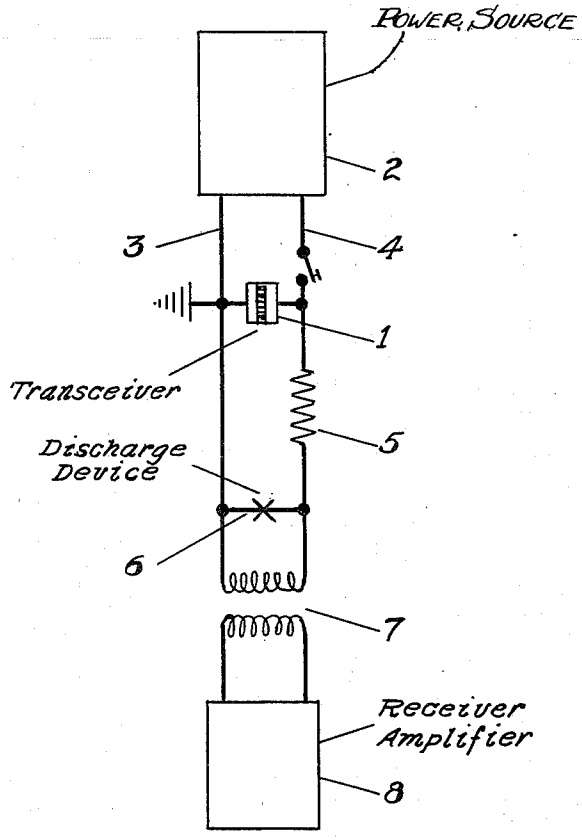

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SENDING AND RECEIVING CIRCUIT

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1 Claim. (Cl. 177—386)

The present invention relates to a system for transmission and reception of sound waves, particularly such systems for use in sound ranging and depth sounding in which the unit for transmitting the sound compressional waves into the water and for receiving the waves is the same.

In systems of this type various means have been used so as to avoid disconnecting the receiving circuit when the device is used as a transmitter. Among these methods are the so-called balanced-circuit method in which the receiving circuit is placed in a balanced position so that when power is being transmitted, the receiving circuit will be connected across a point in the system at which the potential is zero. In all systems of this type the balancing has only been obtained by consuming as useless energy about fifty percent of the energy available in the system, and under circumstances where the power is limited, this has proved a considerable handicap in operating the transmitting unit at its full capacity.

The present invention is more particularly applied to the sound-ranging systems of high frequencies in which piezo-electric supersonic oscillators or magnetostrictive oscillators are employed for producing the sound waves. Systems of this nature may be energized by power at a high potential and therefore if the receiving circuit remains connected across the transmitting unit while the system is being used for transmission, damage may be done to the receiving system.

In the present invention the receiving system is permanently connected across the transceiver which is the single element used both for transmitting and receiving compressional waves, but means are provided in the system whereby the high potential impressed upon the transceiver when transmission is taking place does not affect the receiving circuit.

The present invention will be more fully described in connection with the drawing in which 1 represents the transceiver which may be a quartz or Rochelle-salt crystal oscillator or a magnetostriction oscillator. The electrical energy for energizing the transceiver may be supplied by a vacuum tube driver circuit 2 or any other type of power supply which may be a generator or some other suitable form. The driving circuit is permanently connected across the transceiver by means of the leads 3 and 4 and may be operated in any desired fashion for the purposes of two-way signaling or communication either in code signaling between vessels in submarine sound transmission or in depth sounding in which the transmitting circuit is operated for very short-time periods. There is also connected across the transceiver a shunt circuit comprising a resistance 5 and the discharge device 6 in series. Across the discharge device there is connected an output transformer 7 or other suitable output element coupling the transceiver to the receiver 8. The receiver 8 may be of any suitable type and may produce a visual or an aural indication. The receiver 8 includes a circuit having a high input impedance, as, for instance, a vacuum tube amplifier having the secondary of the transformer 7 connected to the grid of a vacuum tube of the 201A type, whereby the input impedance into the receiver circuit may be made practically infinite.

Compared to this input impedance a resistance 5 across the transceiver may be of the order of 200,000 ohms. The discharge device which may be a neon tube or in place of this some element, such as "Thyrite", which breaks down at low voltage and allows current to pass through, may be used across the primary of the transformer 7. When the circuit is being used for sending, the voltage developed across the discharge device 6 will be sufficient to break down the tube so that a continuous discharge occurs through the resistance 5 and the discharge device 6.

The power consumed in this circuit, however, is small as compared with the power impressed upon the transceiver so that very little power is lost in the transmitting system. At the same time the receiving circuit is protected since the break-down voltage across the discharge device is not of sufficient value to harmfully affect the receiving circuit.

When the circuit is used for receiving, the energy picked up by the transceiver 1 is impressed directly across the primary of the transformer 7 through the resistance 5, which resistance forms only a small fraction of the impedance of the circuit and therefore does not affect the efficiency of the receiving system. The discharge device 6 not being broken down under these conditions, the resistance is practically infinite and therefore no energy is shunted across the primary of the transformer, the full power being available for operating the receiving circuit.

The system of the present invention has particular application in depth sounding where shallow depths are to be measured. Under these conditions it is not possible to use a relay, for the time allowed for disconnecting the transmitting circuit and connecting the transceiver to the

receiving circuit is so short that the shallower depths can not be observed. In the present system it will be noted that the transmitter and receiver are permanently connected across the transmitting and receiving unit and that the receiving system is immediately available to receive the sound waves after transmission has ceased.

Having now described my invention I claim:

A sound transmission and receiving system including a transceiver having a high impedance, an electrical power source permanently connected to said transceiver and adapted to impress a difference of potential across the same, a receiver, means connecting said receiver to said transceiver including a shunt circuit having a resistance in one leg and means having initially a high resistance connected across the shunt between the resistance and receiver and adapted to discharge and short-circuit the resistance across the transceiver above a given difference of potential impressed upon the transceiver.

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