

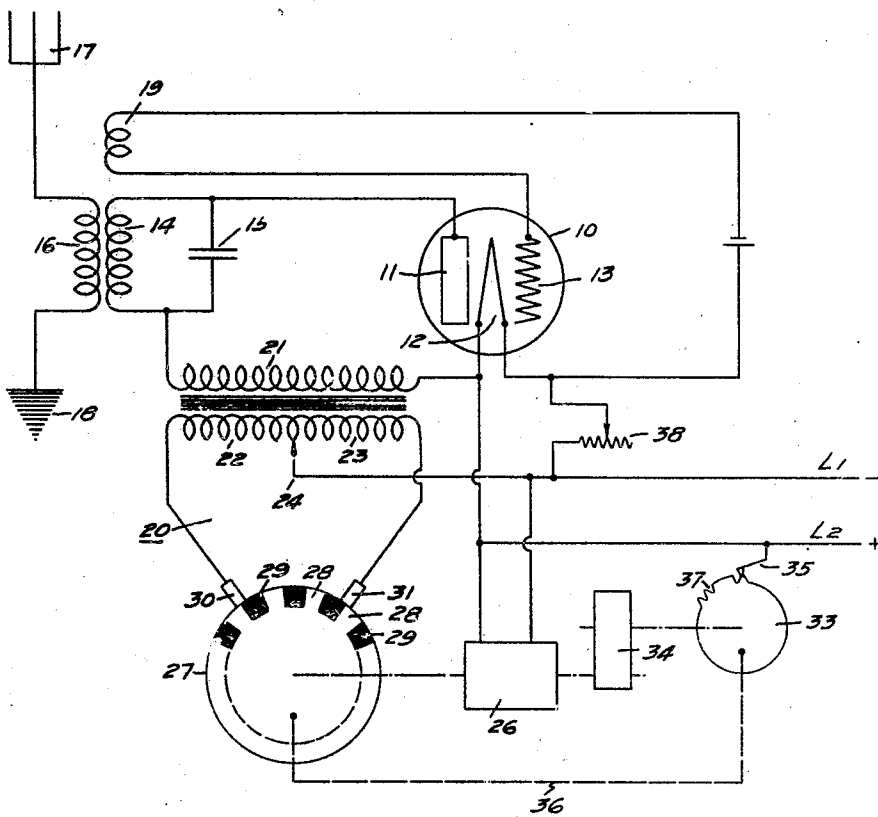
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RADIO TRANSMISSION SYSTEM

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RADIO TRANSMISSION SYSTEM

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This invention relates generally to radio systems such as are utilized for the automatic transmission of signals.

It is an object of this invention to devise a system of radio signaling for facilitating the piloting of ships.

It is a further object of this invention to devise a novel form of automatic beacon radio transmitter suitable for use on ships.

It is another object of this invention to devise an improved system and apparatus for operating an oscillator from a source of direct current.

Further objects of the invention will appear from the following description in which I have set forth the preferred embodiment of my invention. It is to be understood that the invention is to be accorded a range of mechanical and electrical equivalents consistent with the state of the prior art.

Referring to the drawings, the single view is a circuit diagram illustrating the principles of this invention.

In the past, radio equipment upon ships has been limited to radio compasses and the regulation transmitting and receiving equipment, and sirens or other sounding devices have been relied upon to prevent collisions in fog. Sound waves however are not entirely reliable for beacon signaling since they are apt to be intercepted by an intermediate vessel and because their intensity is not always an indication of the proximity of the source. In this invention it is proposed to supply each ship with a small radio transmitter adapted to automatically transmit a warning signal upon a definite wave length. If two or more ships come sufficiently close together to be within the range of their respective signaling equipment, the operators upon the respective ships will be provided with suitable receiving apparatus so that they will be able to pick up the beacon signals transmitted from the other ship. According to the intensity of these signals they can judge the proximity of the other ship or by the use of a directional receiving equipment they can locate the approximate direction as well as the distance. The individual beacon transmitters are in the form of a small oscil-

lator operated from a direct current supply, a suitable interrupting device being employed for converting this direct current to alternating current at the desired signaling frequency. An automatic coding device is also employed so that the transmitter will automatically transmit a certain signal at regular intervals.

Thus referring to the transmitter illustrated in the drawing, there is shown a small oscillator, preferably of the tube type, employing an electron emission tube 10 having the usual plate or anode 11, electron emission element or filament 12, and grid or control electrode 13. The plate or output circuit of the oscillator tube includes an inductance 14 which is tuned by means of capacitance 15, and which is coupled as by means of inductance 16, to transfer energy to a suitable absorption circuit including antenna 17 and ground 18. In order to cause tube 10 to oscillate, the plate circuit is arranged to feed back energy to the control circuit as by means of an inductance 19 in series with grid 13 and coupled to the inductance 14 of the output circuit.

Although the transmitter as a whole is intended to operate from a supply of direct current, the oscillator itself is supplied with alternating current from a suitable converter designated generally at 20, which serves to convert the direct current to alternating current at a signal frequency of say from 500 to 600 cycles per second. This converter in its preferred form comprises a transformer having a secondary winding 21 included in the output circuit of the oscillator tube 10, and having a pair of primary windings 22 and 23. These primary windings may for convenience be one continuous winding provided with a central tap 24. For alternately varying the current supplied to the windings 22 and 23, there is provided an interrupter which is preferably driven by a motor 26 supplied from the direct current lines L_1 and L_2 . This interrupter is in the form of a wheel or disc 27 having a plurality of connected conductor segments 28 separated by a plurality of insulating segments 29. The stationary brushes or electrodes 30 and 31 are arranged

to contact with the segments and are connected to terminals of the windings 22 and 23. One side of the direct current line is connected to the central tap 24 while the other
 5 line is connected to the conductor segments 28. The brushes 30 and 31 are arranged so that one brush, say the brush 30, is leaving a conductor segment while the brush 31 is making contact with another conductor seg-
 10 ment. Thus the successive energizing periods for the two windings 22 and 23 are overlapped, that is, before the winding 22 is deenergized winding 23 is energized. This arrangement practically eliminates all spark-
 15 ing between the brushes and the conductor segments since the increasing current in one winding as it enters upon its period of energization tends to neutralize or kill the field of the other winding. Thus when the current in
 20 a winding is broken there will be substantially no induced electromotive force to cause sparking. The speed of the interrupter wheel and the number of segments is such that the converter will impart to the oscillator a definite signal frequency in the neighborhood of
 25 500 to 600 cycles per second.

In order to transmit modulated signals the energizing circuit for the windings 22 and 23 is interrupted according to any desired
 30 code combination. For this purpose there is provided a suitable code wheel 33 which is also driven from the motor 26 through suitable speed reducing gears indicated at 34. A brush 35 contacting with this code wheel is connected to one side of the direct current
 35 line L_2 , while the code wheel is electrically connected with the conductor segments 28 of the interrupter wheel by means of a conductor path indicated by the dotted line 36. The code wheel is notched as at 37 so that at
 40 certain spaced intervals the converter will be energized to energize the oscillator, while for the intervals between signals the oscillator will be deenergized. In order to prevent
 45 the possibility of two transmitters being exactly synchronized as to their code signals, the time interval between code signals is preferably made different for each transmitter as by a variation in the speed reducing mechanism 34 or a difference in the speed of the
 50 motor 26. Thus if signals of two transmitters become synchronized they will not continue long in this condition because of the difference in the frequency with which the code signals are sent out. The filament of the oscillator tube 10 is preferably energized
 55 direct from the direct supply lines L_1 and L_2 , a suitable rheostat 38 being employed for controlling the filament current.

30 I claim:

1. A radio signaling system comprising a source of direct current, a transformer having its input supplied from said source, a motor also supplied from said source, an in-
 65 terrupter driven by said motor for varying

the current supplied to the transformer at signal frequency, and a tube oscillator energized from the output of the transformer.

2. A radio signaling system comprising a source of direct current, a transformer hav-
 70 ing its input supplied from said source, an interrupter for varying the current supplied to said transformer at a definite signal frequency, a motor supplied from said source for driving said interrupter, a coding device
 75 driven by said motor and adapted to interrupt the current supplied to the transformer according to a code combination, and an oscillator energized from the output of the transformer.

3. A radio signaling system comprising a tube oscillator having plate and grid circuits coupled together and an electron emission element in the form of filament, a source of direct current connected to said filament, a
 80 transformer having its input supplied from said source, an interrupter for varying the current supplied to the transformer at signal frequency, a motor for driving said inter-
 85 rupter, said motor being supplied from said source, and a coding device driven from said motor, said device serving to modulate the signal frequency in accordance with a code combination, the output of the transformer supplying energy to the plate circuit of the
 90 tube.

4. A high frequency transmitting system comprising a high frequency oscillator including a three-electrode vacuum tube having a plate circuit, a transformer having its secondary
 100 winding included in said plate circuit, the primary winding of said transformer having two terminals and an intermediate tap, a source of direct current having one pole connected to said intermediate tap and the other
 105 pole connected to a circuit path including two interrupters in series, one of said interrupters being operable to make electrical connections alternately with the two terminals of said primary winding, the other of said interrupt-
 110 ers being operable to open and close the circuit through said primary winding periodically in accordance with a predetermined code signal to be transmitted, and an electric motor arranged to be operated by current
 115 from said source, said motor being drivingly connected to both of said interrupters for operating them simultaneously.

5. A system in accordance with claim 4 wherein the oscillator vacuum tube has a
 120 cathode connected to said direct current source for receiving heating current therefrom.

6. A radio signaling system comprising a vacuum tube having a cathode, an anode, and
 125 a control electrode, said cathode being adapted to be energized by current of low potential and the anode being adapted to have a higher potential impressed thereupon, a source of direct current of low potential connected to
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said cathode, a step-up transformer having
a primary winding connected to said source
and a secondary winding connected to said
anode, and an interrupter adapted to periodically interrupt the current in said primary
5 winding.

In testimony whereof, I have hereunto set
my hand.

FREDERICK A. KOLSTER.

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