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SIGNALING

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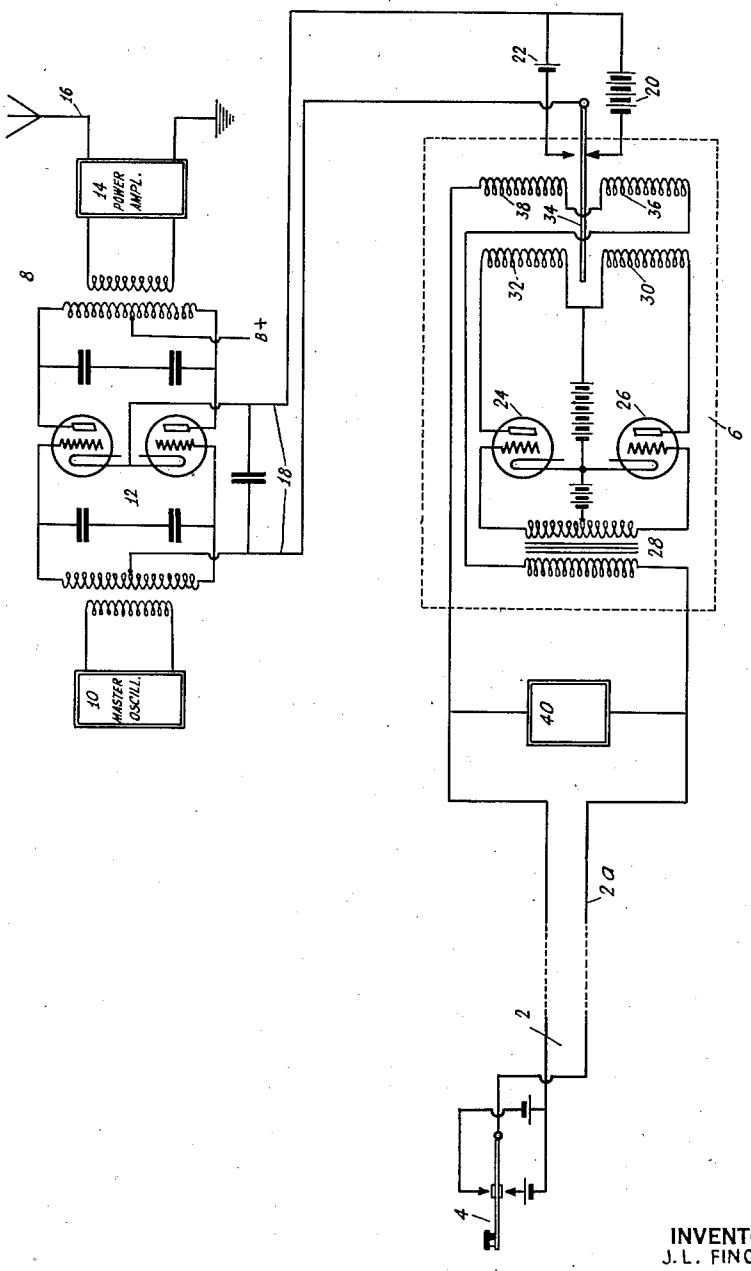

INVENTOR
J. L. FINCH

BY

ATTORNEY

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SIGNALING

James L. Finch, Port Jefferson, N. Y., assignor to Radio Corporation of America, a corporation of Delaware

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Long distance radio transmitters, for example, such as used in transoceanic work are customarily controlled at geographically remote points. Impulses from the remote point are sent over land lines to the transmitting station where they control relays which in turn control energization of the transmitter. As the lines used in this work inherently have uniformly distributed capacity and inductance it takes appreciable time for an impulse to build up to relay operating value at the transmitter end of the line. This is true even though the current impulse builds up rapidly at first at the transmitter end, for, soon thereafter it builds up much more slowly.

For slow speed signaling this is objectionable in that the relay does not cause energization or deenergization of the transmitter as soon as the impulse is placed upon the line but responds some time after, resulting, of course, in energization of lesser time value than intended. During times of peak load, or in other words at times of high speed signaling the same line is used which, because of the characteristic already discussed, has a tendency to prevent, due to rapid reversals on the line during high speed signaling, the current at the transmitter end of the line from ever reaching a value necessary to operate the transmitter controlled relay.

To overcome the foregoing difficulties and to allow of the use of an ordinary land line for accurate control of a transmitter according to impulses sent out on the line is the prime object of the present invention. According to the invention a polarized relay is provided between the line and transmitter which, to give initial and immediate response to the beginnings of signal characters or for high speed signaling is made responsive to rate of change of current flow on the line which, as already indicated is high when a signal is started and during high speed signaling. For low speed signaling additional means are provided to maintain operation of the relay when the rate of change of current has diminished so that uniform flow of current is on the line.

The accompanying drawing which is illustrative and not limitative of the present invention may be referred to to good advantage in further understanding the principles outlined above and also gives by way of example a manner in which the invention may be effected.

Turning to the drawing signaling current impulses sent out on the land line 2 by means of keying device 4 actuate relay apparatus 6 which in turn controls energization of a transmitter 8.

The transmitter 8 comprises a master oscillator 10 feeding energy to a pushpull amplifier 12 whose output is amplified to a high degree by power amplifier 14 and thence transmitted or radiated by suitable antenna 16, preferably of directive character. By controlling the potential across terminals 18 the output of amplifier 12 may be varied from cut off to zero output, to maximum output depending upon the respective connection of biasing sources 20, 22 to terminals 18.

To provide quick action at the starting and stopping of signal characters there is provided in relay apparatus 6 a pair of pushpull connected electron discharge devices 24, 26 having their input coupled to the line by means of a transformer 28. Consequently, at the starting or stopping of signal characters, when the rate of change of current flow through the primary of transformer 28 is high, coils 30, 32 in the output circuits of tubes 24, 26 predominate in controlling the movement of armature 34.

For steady values of current or for low speed signaling coils 36, 38 are provided in the manner shown. In order to properly terminate the line 2 when coils 36, 38 and transformer 28 are connected thereacross, there is also connected a terminating impedance 40 suitably designed to prevent reflection. Also if desired one of the lines forming the land line 2 may be eliminated and the corresponding ends of the eliminated line may be grounded.

More specifically when a positive impulse is sent over the lower line 2*a* of land line 2 by depressing key 4, because of the rate of change of current through transformer 28, vacuum tube 24 becomes conductive pulling armature 34 up thereby reducing the negative bias on amplifier 12 allowing of energization of antenna 16. As the rate of change of current through the primary of transformer 28 decreases, the uniform flow of current through coils 36, 38 manifests itself by holding armature 34 in the position that coil 32 pulled it. Therefore, during uniform flow of current coils 36, 38 become predominant; while, for extremely high speed signaling, entire action is accomplished by coils 32 and 30, the latter of which becomes effective for deenergizing the transmitter when there is a reversal of the current on the land line 2 due to the raising of key 4 to its upper contact. Under the last referred to condition the current through coils 36, 38 is reversed which, of course, predominate in maintaining armature 34 in its lower position

when the rate of change of current in transformer 28 again becomes negligible.

Having thus described my invention what I claim is:

1. In a transmitting system, a source of direct current potential, an armature, an electron discharge device having a coil in its output circuit magnetically associated with said armature, and means for connecting the input circuit of said discharge device to said direct current source whereby said armature is actuated by rate of change of current in the input circuit of said electron discharge device, and, another coil connected directly to said source and magnetically associated with said armature for causing movement of said armature in response to constant current flow from said source.

2. In a transmission system a source of keyed energy, an electromechanical relay having a plurality of coils and an armature, an electron discharge device coupling one of said coils with said source whereby movement of the armature is produced in accordance with the rate of change of current flow from said source, and, connections for coupling the other coil of said relay directly to said source whereby movement is imparted to said armature by virtue of the steady current component flowing through said last mentioned coil.

3. In a system for transmitting intelligence by virtue of the flow of electrical energy keyed in accordance with the intelligence to be transmitted, a transmission line for conducting the keyed electrical currents, an electromechanical relay having a polarized armature and a plurality of coils associated therewith, an electron discharge device connected between said transmission line and one of said coils for imparting motion to said armature in accordance with rate of change of current on said transmission line, and, means for connecting the other of said coils to said transmission line for imparting a force to said armature according to the steady flow of current on said line.

4. Means for keying at high speed or low speed a transmitter including a thermionic amplifier from a remote point comprising, a keying circuit including an armature connected with said amplifier, two pairs of windings associated with said armature, a source of direct current potential located at said remote point, a transmission line for connecting said direct current potential in series with one of said pairs of windings, a pair of thermionic tubes having their anodes connected together through the other pair of said windings, an inductance in said transmission line, and an inductance connected to the input electrodes of said tubes, said last named inductance being coupled to the inductance in said line.

5. In combination, a high frequency oscillation relay device, a keying circuit connected therewith, said keying circuit including a source of energy, a contact and an armature for closing said contact under certain conditions to key said relay device, a pair of magnetic windings associated with said armature, a source of keying currents, means for actuating said armature at a low keying speed including a circuit connecting one of said magnetic windings directly to said source of keying currents, and means for actuating said armature at high keying speed including a thermionic relay coupling said source to the other of said magnetic windings.

JAMES L. FINCH.