

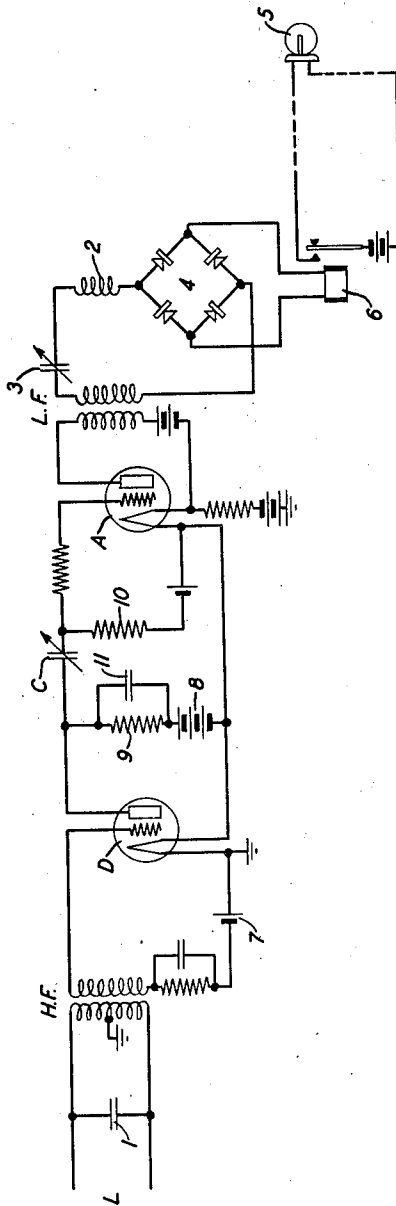
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SIGNALING SYSTEM

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SIGNALING SYSTEM

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6 Claims. (Cl. 179—84)

This invention relates to signaling systems and more particularly to signal receiving and translating means whereby voice frequency signal current interrupted at a predetermined low frequency rate is translated by a vacuum tube detector into a succession of unidirectional impulses recurring at the rate of said low frequency and thereafter amplified and applied to a low frequency receiving circuit to control a signal device in which arrangement means are provided to insure that a predetermined plurality of said successive unidirectional pulses are detected before the receiving circuit is energized sufficiently to register a signal.

The invention will be understood from the following description when read in connection with the accompanying drawing which shows one end of a line over which signal frequencies within the voice range, for example, of the order of 1000 cycles, interrupted at a low frequency rate, for example, of the order of 20 cycles, are transmitted which line terminates in a signal receiving arrangement, according to the present invention, whereby a predetermined number of successive impulses of said 1000-cycle signaling frequency are required to actuate a signal device controlled thereby.

The operation of the invention will be understood from the following.

Referring to the drawing, a line L terminates in the primary winding of a transformer HF tuned to the signal frequency, i. e., in the present case 1000 cycles, by means of a condenser 1, which frequency is impressed on the grid of a vacuum tube detector D by means of its secondary winding. Detector D is resistance coupled to an amplifier tube A whereby the 20-cycle component of the rectified signal is amplified and applied to the primary winding of a transformer LF, the secondary of which is in a circuit tuned to 20 cycles by means of retard coil 2 and condenser 3 which circuit is completed through a rectifier 4 and a relay 6. This rectified output of amplifier A operates relay 6 to control any desired signal device such as lamp 5. The condenser C which serves the usual well-known purpose of isolating the grid of tube A from the plate battery B of tube D serves, in the present invention, another purpose which is to control the time required for the receiving circuit, comprising relay 6, to function.

Normally tube D is biased, by means of grid battery 7, to a point at which no plate current flows between the plate and cathode and, therefore, the plate of tube D, to which one side of

condenser C is connected, is at the full potential of the plate battery 8, for example, 130 volts. Condenser C is, therefore, charged to substantially the full potential of battery 8.

When a signal is received over the line L, the grid of tube D is driven sufficiently positive with respect to the cathode that current flows between the plate and cathode, and the potential of the plate thereupon drops to a low value due to the considerable voltage drop across the coupling resistance 9. Condenser C is, therefore, partially discharged in the circuit including the plate and cathode of tube D and high resistance 10, which may be of the order of 2 megohms, thereby building up a potential across resistance 10 in such a direction as to increase the normal negative bias on the grid of tube A, due to battery 9. Resistance 10 is, however, so high that condenser C does not fully discharge before the signal current reverses its direction and tube D ceases to pass current. When this occurs the discharge path for condenser C is substantially opened and it, therefore, starts to recharge in series with resistances 9 and 10 but, due to the fact that condenser C at this time still retains a considerable portion of its original charge, the potential built up across resistance 10, in a direction to drive the grid of tube A positive, is small. However, the time required to recharge condenser C to its originally charged condition is longer than the time to discharge a like amount due to the fact that the discharge is through the low plate impedance of tube D as compared with the impedance of resistance 9 and condenser 11 in parallel through which it must charge. As a result, the successive impulses of signaling current applied to tube D gradually causes condenser C to become discharged sufficiently so that the next charging interval builds up a sufficient potential across resistance 10 in such a direction that the grid of tube A becomes sufficiently positive to permit a plate current flow in that tube which will actuate relay 6.

As the value of condenser C plays an important part in determining the time constant of the coupling between tubes D and A, it is apparent that by varying its capacity the duration of a signal required to operate the signal relay 6 may be controlled.

What is claimed is:

1. In a signaling system, a line, a source of audible frequency current, means for connecting said audible frequency to said line at a periodic low frequency rate, a signal device, and means, including a thermionic detector and a thermionic

amplifier, responsive to said periodically applied audible frequency to control said signal device, in which the output circuit of said detector is connected to the input circuit of the amplifier by means of a condenser-resistance coupling, characterized in this, that the time constants of said coupling are so adjusted that a predetermined plurality of successive pulses of said audible frequency are required to cause said amplifier to control said signal device.

2. In a signaling system, a line over which is transmitted alternating current within the audible frequency range interrupted at a low frequency rate, a signal device adapted to be controlled thereby, and means for introducing a predetermined delay interval between the transmission of said alternating currents and the response to said device, said means comprising a thermionic detector having an input circuit connected to the line, a thermionic amplifier having an output circuit including said signal device, and a condenser-resistance coupling, having a predetermined time constant, between the output circuit of the detector and the input circuit of the amplifier.

3. In a signaling system, a line over which is transmitted alternating current within the audible frequency range, a signal device to be controlled thereby, a thermionic detector having its input circuit connected to said line, a thermionic amplifier having its output circuit including said signal device, and a circuit network between the output of said detector and the input of said amplifier including means responsive to a normal no-signal transmission condition to block said amplifier, and means responsive to operation of said detector during signal transmission to slowly unblock said amplifier.

4. In a signaling system, a line over which is transmitted alternating current within the audible frequency range, a signal device to be controlled thereby, a thermionic detector having its input circuit connected to said line, a thermionic amplifier having its output circuit including said signal device, and a coupling circuit between the output of said detector and the input of said

amplifier including a source of direct current and a condenser normally charged thereby to block said amplifier, and means responsive to continued operation of said detector to slowly discharge said condenser to unblock said amplifier.

5. In a signaling system, a line over which is transmitted alternating current within the audible frequency range, a signal device to be controlled thereby, a thermionic detector having its input circuit connected to said line, a thermionic amplifier having its output circuit including said signal device, and a coupling circuit between the output of said detector and the input of said amplifier, including a source of potential and a condenser normally charged thereby, to block said amplifier, and means responsive to continued operation of said detector to discharge said condenser to unblock said amplifier, the constants of the elements of said coupling circuit being so arranged that the rate of discharge of said condenser may be controlled to prevent said signal operating on a transitory operation of said detector.

6. In a signaling system, a line over which is transmitted alternating current of a frequency within the voice range interrupted at a low frequency rate, a thermionic detector having an anode, a cathode, and a grid, said grid and cathode being connected to said line, an output circuit for said detector serially including said anode, cathode, a source of direct current, and a high resistance, a thermionic amplifier also having an anode, a cathode and a grid, a connection including a condenser between the detector, anode and the amplifier grid, a connection between said cathodes, a second resistance connection between said amplifier grid and cathode, and an output circuit for said amplifier including a signal device to be controlled, said resistances and condenser being so chosen that a predetermined time interval will elapse between transmission of said interrupted alternating current and the establishment of such a potential on said amplifier grid as to cause the amplifier output circuit to control said signal device.

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