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S. LOEWE

VACUUM TUBE SIGNALING SYSTEM

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Fig. 1

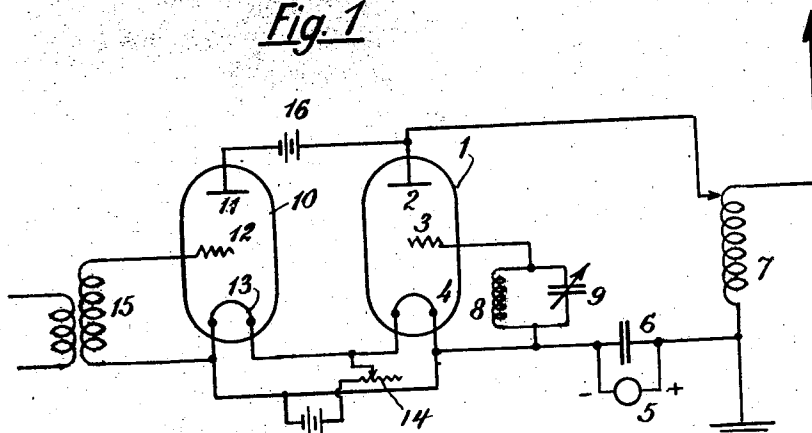
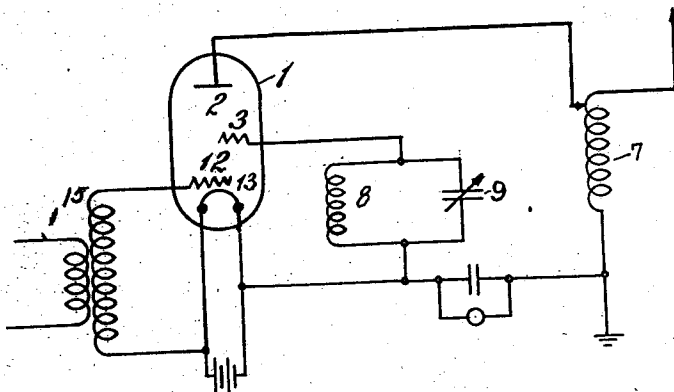


Fig. 2



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VACUUM-TUBE SIGNALING SYSTEM.

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(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

This invention relates to the transmission of intelligence by electric currents, more especially radio transmission systems utilizing vacuum tube generators.

The invention will be clearly understood by reference to the accompanying drawings, in which preferred embodiments are illustrated. In these drawings,

Fig. 1 represents a radio transmission system using a vacuum tube oscillator and a vacuum tube modulator;

Fig. 2 illustrates a vacuum tube adapted to take the place of the two vacuum tubes illustrated in Fig. 1.

In Fig. 1 a vacuum tube oscillator 1 having an anode or plate 2, a cathode or filament 4, and a control electrode 3 is shown with its output circuit connected to an antenna by means of the inductance 7. A source of direct current energy 5 is included in the output circuit of this tube and is shunted by means of a condenser 6. An oscillatory circuit comprising the inductance 8 and the capacity 9 is included in the circuit between the cathode 4 and the control electrode 3. The circuits of this tube may be so adjusted that it will function as a generator of oscillatory current energy.

In order to control the energy output of this oscillator tube, a modulator tube 10 is provided having plate 11, grid 12 and filament 13. The filaments of both tubes may be energized from a common source 14. The plates of the two tubes are connected together preferably through a source of potential 16. The modulator tube in this manner is in effect a resistance in shunt with the output of the oscillator tube and to control the value of this resistance the control electrode 12 includes in its circuit an inductance 15, upon which may be impressed potential varying in accordance with the speech frequency. A vacuum tube amplifier controlled by a capacitance or inductive microphone is particularly suitable for this control.

The tube 10 may of course have similar electrical properties to the tube 1, but it

is highly advantageous to specially design it in view of the following considerations.

The transmitting tube is generally operated at a high voltage, and as it is a generator of oscillatory energy, the grid 3 is subject to very high voltages. It is very difficult to impress on this grid by means of a modulator tube a voltage of sufficient magnitude to considerably affect the energy output. Thus it is necessary to so construct the tube 10 that a relatively great difference in conductivity between the filament 13 and plate 11 is secured by a small variation in the potential of the grid 12. Under these conditions the amount of energy diverted from the output circuit of the tube 1 will be appreciable even though the variation in the grid of the tube 10 is very small.

In Fig. 2 there is illustrated a special form of vacuum tube which is adapted to replace both of the vacuum tubes illustrated in Fig. 1, the circuit connections remaining essentially the same. The novel feature in this vacuum tube is the introduction of a control electrode 12 which is preferably very close to the filament 13 in order that a small change in potential may be effective in controlling the flow of electrons between the filament 13 and the plate 2. The control electrode 3, on the other hand, since it serves only to maintain the high-frequency oscillation, may be much more remote from the cathode. As indicated in Fig. 2, the grid 12 is much closer to the cathode than the grid 3. The output circuit of the oscillator includes the plate 2 and the filament 13, and the input circuit includes the grid 3 and the filament 13. In order to transmit sound by this apparatus the oscillating circuits are adjusted so that oscillatory current energy is generated and the grid 12 is connected to a source of potential which is varied in accordance with the frequency of the sound to be transmitted.

I claim:

In a vacuum tube oscillation device, an exhausted envelope, a cathode, an anode,

and a pair of additional electrodes in said envelope, the additional electrodes being intermediate the cathode and anode and one of them being much nearer the cathode than the other, whereby the amplification constant of the nearer one is greater than that of the farther one, means associated with the anode, the cathode and the farther intermediate electrode to maintain oscillations, and modulation-producing means associated with the cathode and the nearer intermediate electrode for modulating said oscillations. 10

In testimony whereof I affix my signature.

DR. SIEGMUND LOEWE.