Dec. 10, 1940. L. T. MOODEY ET AL 2,224,690

MODULATED CARRIER WAVE TRANSMITTER

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Fig. 1

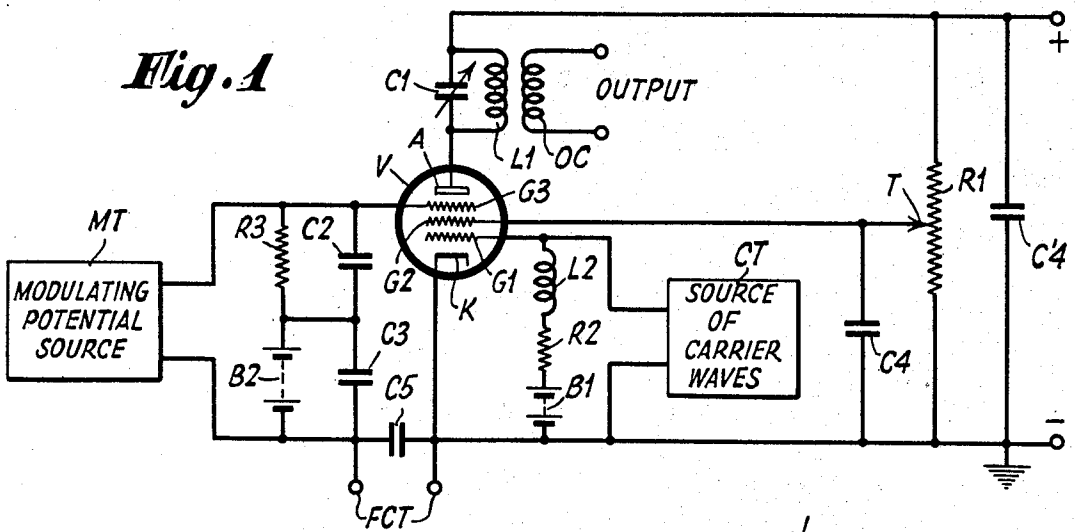


Fig. 2

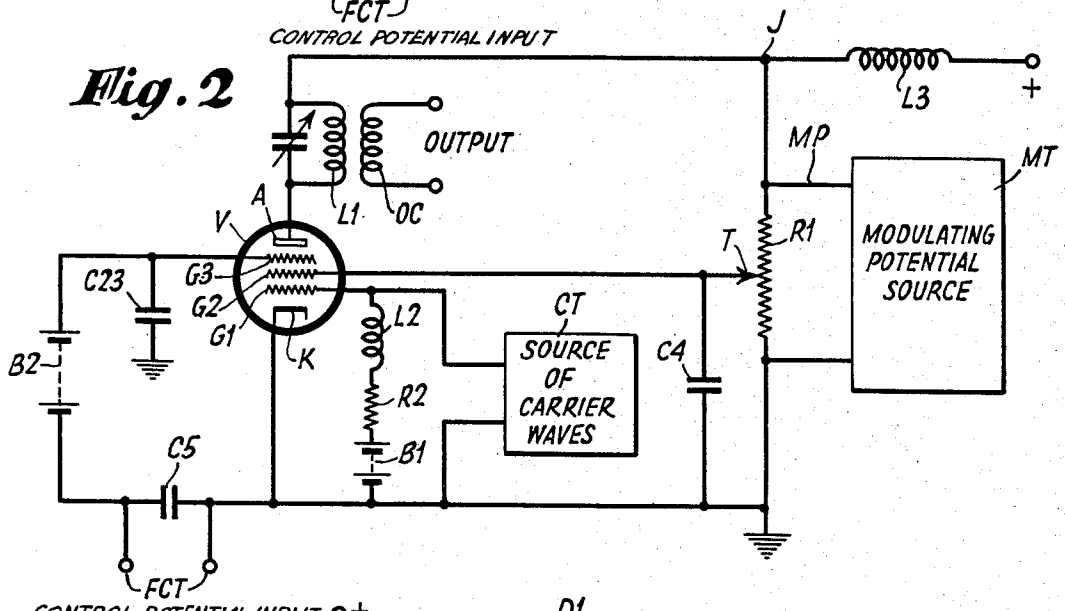
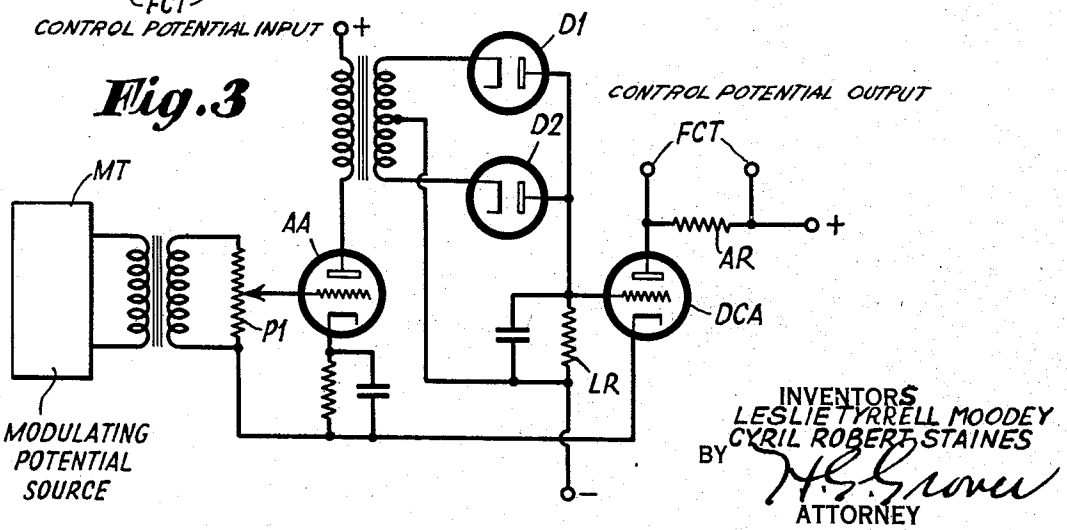


Fig. 3



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MODULATED CARRIER WAVE TRANSMITTER

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1 Claim. (Cl. 179—171.5)

This invention relates to modulated carrier wave transmitters and has for its object to provide improved modulated carrier wave transmitters of the so-called "floating carrier" type, i. e. of the type wherein the carrier level is automatically varied in dependence upon the level of the modulation signals.

As will be seen later the invention provides improved modulation circuits wherein the carrier to be modulated is applied to one electrode and the modulating signals to another electrode of a tube from whose output circuit modulated carrier is obtained, said electrodes being screened from one another so that the modulation process is effected substantially only electronically. The invention enables floating carrier control to be effected in a modulation circuit of this nature without materially adding to the complexity of the circuit and offers the important practical advantages of simplicity and efficiency.

According to this invention a modulation circuit arrangement of the floating carrier type comprises a tube having a cathode, an anode and at least three grids in succession therebetween, one of said grids being arranged to act as a screen grid, means for applying carrier potential to a grid on one side of said screen grid, means for deriving a uni-directional potential varying in dependence upon the modulating potential level from the modulating potentials, and means for applying said derived potential and modulating potentials either to a common electrode on the other side of said screen grid or the derived potential to one and the modulating potentials to the other of two electrodes which are both on said other side of said screen grid.

The invention is illustrated in the accompanying diagrammatic drawing.

Referring to Figure 1 which shows one embodiment the first grid G1 (counting from the cathode) of a pentode tube V is connected to the earthed cathode K thereof through a choke L2 in series with a resistance R2 in series with a suitable bias source B1. The carrier wave to be modulated is applied at terminals CT between the first grid G1 and the cathode K. The second grid G2, which is the screen grid, is connected to an adjustable tap T upon a potentiometer resistance R1 which is connected across a source (not shown) of high tension whose terminals are indicated by the + and — signs and whose negative terminal is earthed. This tapping point T is connected to earth through a bypass condenser C4 and the high tension source is also shunted by a suitable by-pass condenser C4'. The third grid G3 is connected to the cathode K through a resistance R3 in series with a bias source B2 in series with a condenser C5 (in the order named) said resistance and said bias source being shunted by condensers C2, C3 respectively. Modulating potentials are applied from a source MT across the series circuit consisting of the resistance R3 and bias source B2 and a uni-directional potential obtained in any convenient manner known per se and varying in dependence upon the modulating potential level, is applied across the condenser C5 at the terminals FCT. Thus modulating potentials with the uni-directional potential superimposed, are applied to the third grid G3. The anode A of the tube is connected to the positive terminal of the high tension source through a parallel tuned carrier frequency output circuit C1L1, modulated carrier output being taken off from across this circuit, e. g. as shown by means of a coil OC coupled to the inductance L1.

In the modification shown in Figure 2 the modulating potentials are applied to the anode A instead of to the third grid G3. In this modification the third grid G3 is connected to the cathode K merely through the bias source B2 and condenser C5 in series and the uni-directional potential is applied across this condenser C5 as before, the said third grid G3 being connected to earth through a by-pass condenser C23. The potentiometer resistance R1, instead of being connected directly at one end to the positive terminal of the high tension source, is connected to said terminal through a choke L3, and modulating potentials are applied over lead MP to the junction point J of said choke L3 with said potentiometer resistance R1, said junction point being connected, through the output tuned circuit L1C1, to the tube anode A. In other respects the circuit arrangement is as in Figure 1.

The uni-directional potential by means of which the floating carrier control is obtained may be derived in any convenient manner. For example, as shown in Figure 3 modulating potentials, after such amplification as may be desired (in Figure 3 a single stage amplifier AA is shown) may be rectified by a suitable full wave rectifier circuit—shown as a rectifier arrangement comprising two diodes D1, D2—the capacity shunted load resistance LR of which is included in the grid circuit of a direct current amplifier valve DCA whose anode circuit includes a resistance AR which is connected to the terminals FCT of Figure 1 or 2, i. e. in parallel with the con-

denser C5 (not shown in Figure 3) across which (in each of the two embodiments of Figures 1 and 2) the uni-directional potential is to be applied. P1 is a potentiometer whereby the modulation input to the valve AA may be adjusted.

Although the invention has been specifically described as applied to circuits wherein there is only one tube to which modulating and carrier potentials are applied the invention is not limited to such applications and may be applied, with comparatively minor circuit modifications necessitated by the change, to circuits employing a plurality of such tubes either in parallel or in push-pull.

What is claimed is:

In a modulation system an electron discharge device having an anode, a cathode, a screen grid electrode, a grid electrode between said screen grid electrode and anode and a grid electrode between said screen grid electrode and cathode, a source of modulating potentials, a source of carrier wave energy to be modulated, a circuit connecting said source of carrier wave energy to said cathode and to said grid electrode between said screen grid electrode and cathode, a resistance having one terminal connected to said anode and the other terminal connected to said cathode, means for impressing a direct current potential on said resistance, a connection between said screen grid electrode and a point on said resistance, means for impressing direct current potentials which vary substantially in accordance with the mean amplitude of the modulating potentials between the cathode and the grid electrode between said anode and screen grid electrode, and means for impressing modulating potentials from said modulating potential source on the anode of said tube and said cathode.

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