Nov. 15, 1938. I. A. MITCHELL 2,136,704

RADIO CIRCUIT

Filed March 14, 1935

FIG. 1.

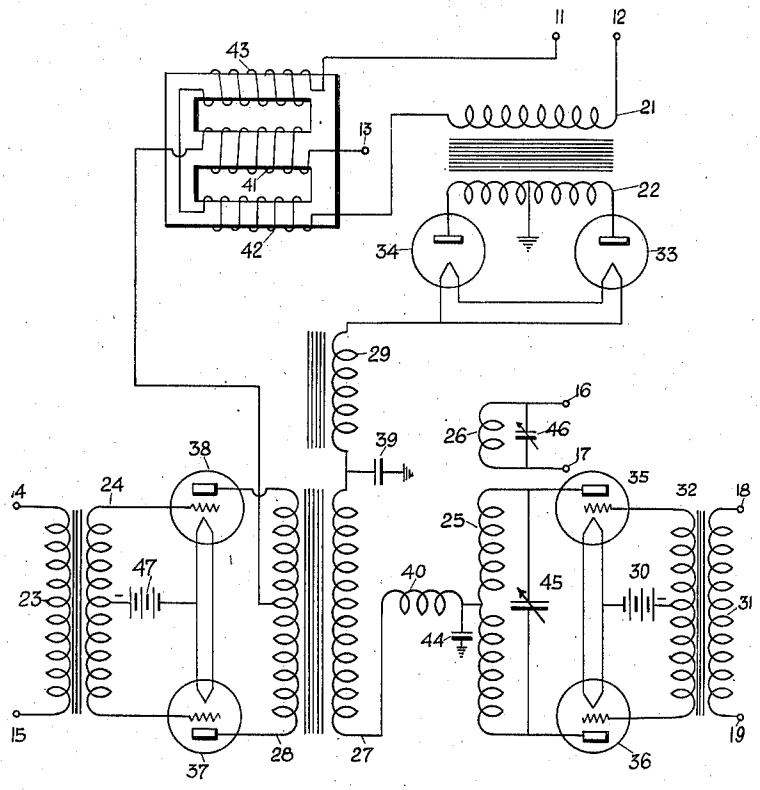
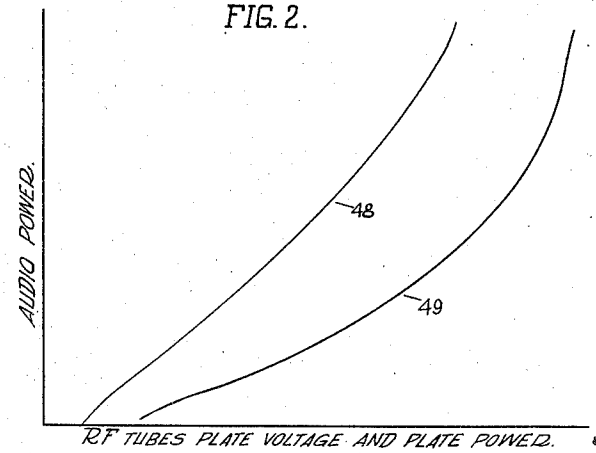


FIG. 2.



Isaac A. Mitchell
INVENTOR.

BY Henry M. Wolfson
ATTORNEY.

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RADIO CIRCUIT

Isaac A. Mitchell, Brooklyn, N. Y.

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1 Claim. (Cl. 179—171)

One object of my invention is to provide a method of controlling the plate voltage applied to a plate of a vacuum tube or a plurality of such plates by means of the current flowing in another vacuum tube plate or a plurality of such plates.

Another object of my invention is to provide a method of controlling the strength of a signal in one part of a radio circuit by means of the strength of a second signal in another part of the circuit.

Further objects will appear from a study of the following description of one embodiment of my invention disclosed in the annexed drawing in which

Figure 1 is a partial schematic of a radio transmission circuit and

Figure 2 shows the relationships between audio frequency power and radio frequency plate wattage input and between audio frequency power and radio frequency tube plate voltage obtained in the circuit of Figure 1.

The embodiment of my invention disclosed in the accompanying drawing comprises a radio frequency tube "B" supply, a variable inductor, an audio frequency amplifier and a radio frequency amplifier.

Elements 11 and 12 are terminals to which an alternating current supply is connected. Terminal 13 is connected to a "B" battery supply for vacuum tubes 37 and 38. Terminals 14 and 15 are the input to the last stage of amplification of an audio frequency amplifier and terminals 18 and 19 the input to the last stage of amplification of a radio frequency amplifier. Terminals 16 and 17 are the output terminals of the transmitter. Windings 21, 23 and 28 are the primaries of audio frequency transformers coupling the various parts of the circuit in the customary manner. Windings 22, 24 and 27 are the corresponding secondaries of these transformers. Windings 31 and 25 are the primaries of radio frequency transformers and windings 32 and 26 are their secondaries. Winding 41 is the D. C. winding of a standard type of varioductor commonly known in the art in which the variation in magnetic field strength in the core caused by variations of current strength in the D. C. winding causes corresponding impedance changes in the A. C. winding, and windings 42 and 43 are the A. C. windings of the varioductor. Element 40 is a radio frequency choke and element 29 is an audio frequency choke.

Condensers 45 and 46 are used to tune the radio frequency circuit to the particular carrier frequency being used. Condensers 44 and 39 act together with their respective chokes, 40 and 29, as filters to exclude the carrier from the audio circuit and the alternating current from the rectifier circuit.

Vacuum tubes 33 and 34 constitute a full wave rectifier. Vacuum tubes 35 and 36 are part of the radio frequency amplifier and 37 and 38 are part of the audio frequency amplifier. Batteries 30 and 47 are the customary grid bias batteries.

The rectifier circuit operates in accordance with commonly known principles to furnish plate voltage to the radio frequency amplifier. The audio frequency amplifier signal modulates the radio frequency signal in accordance with well known principles.

The fluctuations in signal strength in the audio frequency amplifier cause a variable direct current to flow through winding 41 of the varioductor. In accordance with well known principles this varying current causes the impedance of windings 42 and 43 to vary. Since these windings are in series with winding 21, the voltage applied to the rectifier and consequently to the plates of the radio frequency amplifier is accordingly also varied. A proper proportioning of the various elements of the circuit furnishes the relationships shown in Figure 2 in which 49 represents the variation of radio frequency plate voltage with audio frequency power, and 48 represents the variation of radio frequency plate wattage input with audio frequency power. As can be seen, 49 is a straight line over most of its length.

The circuit shown permits among other things a considerable saving in power, the radio frequency circuit being operated at the requisite power output for any given audio signal, instead of at maximum power as in ordinary circuits.

The foregoing detailed description illustrates one embodiment of my invention. It is obvious that it can be employed in other types of circuits such as, amongst others, in superheterodyne receiving circuits. These would merely be alternative means of accomplishing the objects of the invention, as specifically pointed out in, and limited only by the appended claim.

I claim:—

In a radio circuit a low frequency source, a high frequency source, a vacuum tube amplifier including an anode connected to the low frequency source, an output circuit including a power supply source for said amplifier connected to said anode, means for coupling the high frequency source to a high frequency amplifier, said amplifier having an output circuit and a separate

power supply source therefor, means for modulating the high frequency source by the low frequency amplifier output, a reactor having direct current and alternating current windings such that the impedance of the alternating current winding varies as the current in the connecting the direct current winding into the anode circuit of the audio frequency amplifier, means for coupling a commercial alternating current supply source to said alternating current winding and means for coupling said alternating current winding to the power supply means for said high frequency amplifier whereby the power supply means for said high frequency amplifier varies with the variation in the direct current flowing through the reactor.

ISAAC A. MITCHELL.