

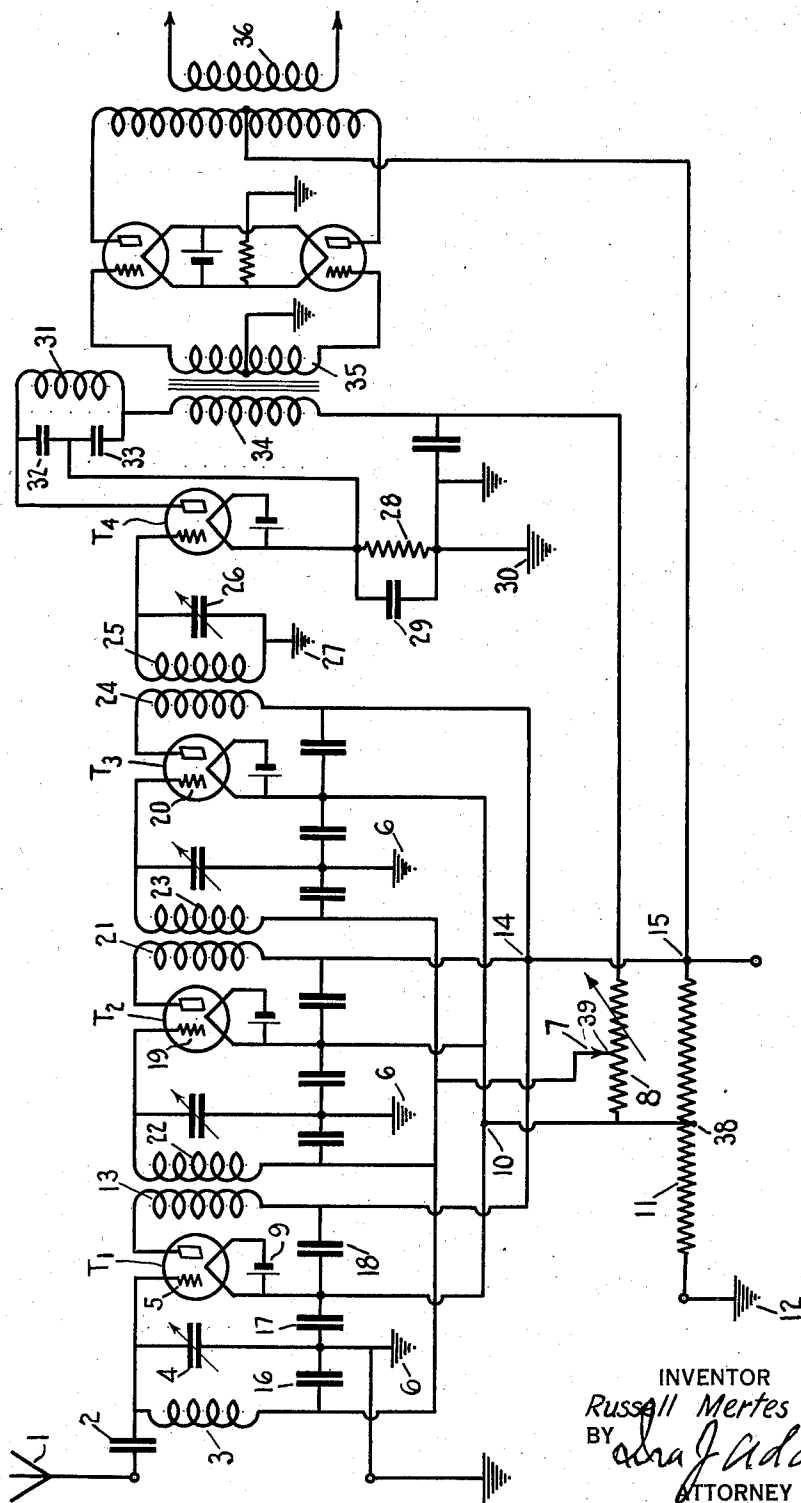
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AUTOMATIC VOLUME CONTROLS FOR RADIO RECEIVING SETS

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AUTOMATIC VOLUME CONTROLS FOR
RADIO RECEIVING SETS

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2 Claims. (Cl. 250—20)

This invention relates to radio receiving sets and more particularly to automatic volume controls whereby volume may remain substantially uniform regardless of the strength of the signal reaching the antenna.

One object of the invention is to produce a volume control that is automatic in operation with minimum complication of circuit connections.

Another object of the invention is to bias the amplifier tubes in a radio set by a potential drop in the direct current circuit of the plate in the detector tube.

Another object of the invention is to construct a volume control in which the resistance used to furnish the drop for the negative bias is also capable of hand manipulation to set the volume at any desired value without changing the automatic action in respect to this resistance control.

Other objects of the invention will appear in the following description, reference being had to the drawing in which the single figure is a diagrammatic illustration of the circuits embodying the invention.

Referring to the drawing, the antenna 1 is connected through a condenser 2 to a tuned circuit consisting of an inductance 3 and a variable capacity 4 although the inductance may be varied instead of the capacity, if desired. The inductance and capacity are joined together in the grid 5 of the first radio frequency tube T₁. The opposite end of the capacity 4 is connected to ground 6 and the opposite end of the inductance 3 is connected through a variable tap 7 of resistance 8.

The filament of the first radio frequency tube may be connected to a power supply but for simplicity in illustration I have generally indicated the source at 9. One end of the filament is connected to point 10 which is joined to an intermediate portion of the power supply resistance 11 which resistance has its negative end grounded at 12. The plate of radio frequency tube T₁ is connected to the primary 13 and to a junction point 14 which is joined to the high potential end 15 of the resistance 11. The inductance 3 and the filament 9 are connected through small condensers 16, 17, to the low potential end of the tuning condenser 4. The lower end of coil 13 is likewise connected to the same point in the filament by a small condenser 18.

The radio frequency tubes T₂, T₃, or any greater or less number, are connected so that

their grids 19, 20, are coupled to the preceding primaries 13 and 21 by secondaries 22 and 23. The tracing of the circuits in the second and third radio frequency stage will be the same as has been described in connection with the first radio frequency stage and a detail description need not be resorted to.

The plate primary 24 of the last radio frequency tube T₃ is coupled to the secondary 25 of the detector tube T₄. Variable condenser 26 is connected in parallel with this secondary for tuning purposes and the low potential end is grounded at 27. The filament of this detector tube is connected through a resistance 28 and parallel condenser 29 to the ground 30. The plate of the detector tube is connected through an inductance 31 having two condensers 32, 33, connected in series and in parallel of the inductance. The midpoint of the condensers is connected to the end of resistance 28, as shown, so as to furnish a radio frequency bypass. The plate circuit is then completed through the primary 34 of the audio frequency transformer and thence through the resistance 8 which is variable, as indicated. The low potential end of this resistance is connected to an intermediate point in the power supply resistance 11, as shown.

The primary 34 of the audio transformer is coupled to the secondary 35 of a push-pull amplifier. The method of connection will be obvious from the drawing and further description need not be made except to state that the loud speaker or other signal receiving device (not shown) will be connected to the secondary 36 of the push-pull transformer in the plate circuits of the tubes.

With the foregoing circuit arrangement direct current for the plate supply of the detector T₄ will pass from the intermediate point 38 of the power supply resistance through volume control resistance 8 through the plate filament and resistance 28 to ground 30 and thence back to the low potential end of resistance 11 through ground 12. This will produce a potential drop in the resistance 8, depending upon the average amount of direct current flowing in that circuit. The grids 5, 19 and 20 of the radio frequency amplifier tubes being connected to the point 7 will have a negative bias because the filaments are connected to the point 38 in the resistance 11 which is at a higher potential than the point 39 to which the grids are connected, that is, the grids are biased by a portion of the potential drop in the plate circuit of the detector.

With bias detection increase of signal in the plate circuit of a detector increases the average direct current flow in the plate circuit. This increase of average direct current in the plate circuit of the detector increases the potential drop in resistance 8, thus increasing the drop between the points 38 and 39 that biases the amplifier tubes. This increase of bias on the amplifier tubes decreases the amplification of those tubes. Therefore when the signal tends to increase the circuit connection immediately tends to decrease the amplifying power of the tubes and weakens the signal. It of course takes an increase of signal to cause the volume control to function but this increase is kept to a minimum by the automatic control and the volume is maintained reasonably constant regardless of strength of signal. In this respect the automatic volume control is comparable to the action of a fly ball governor on a steam engine.

Having described my invention, what I claim is:

1. In a volume control for radio receiving sets, a direct current source of potential, a resistance connected to said source, a detector tube, a second resistance connected between a point on the first resistance and the output electrode of the detector, a third resistance connected between the cathode of the detector and a point

in the first resistance negative to the first mentioned point, the grid of the detector being connected to a point in the third resistance negative to the first mentioned point, a radio frequency amplifier tube having its control electrode and cathode connected respectively to negative and positive points in the second resistance, and means to connect the output electrode of the radio frequency amplifier tube to the input electrode of the detector tube.

2. In a volume control for radio receiving sets, a direct current source of potential, a resistance connected to said source, a detector tube, a second resistance connected between an intermediate point on the first resistance and the output electrode of said detector, a third resistance connected between the cathode of the detector and the negative terminal of the first resistance, the grid of the detector being connected to said negative terminal, a radio frequency amplifier tube having its cathode connected to the junction point of the first and second resistances, and its control electrode connected to a point in the second resistance negative to said junction point, and means to connect the output electrode of the radio frequency tube with the input electrode of the detector.

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