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C. HEINECKE

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RECEIVER VOLUME CONTROL

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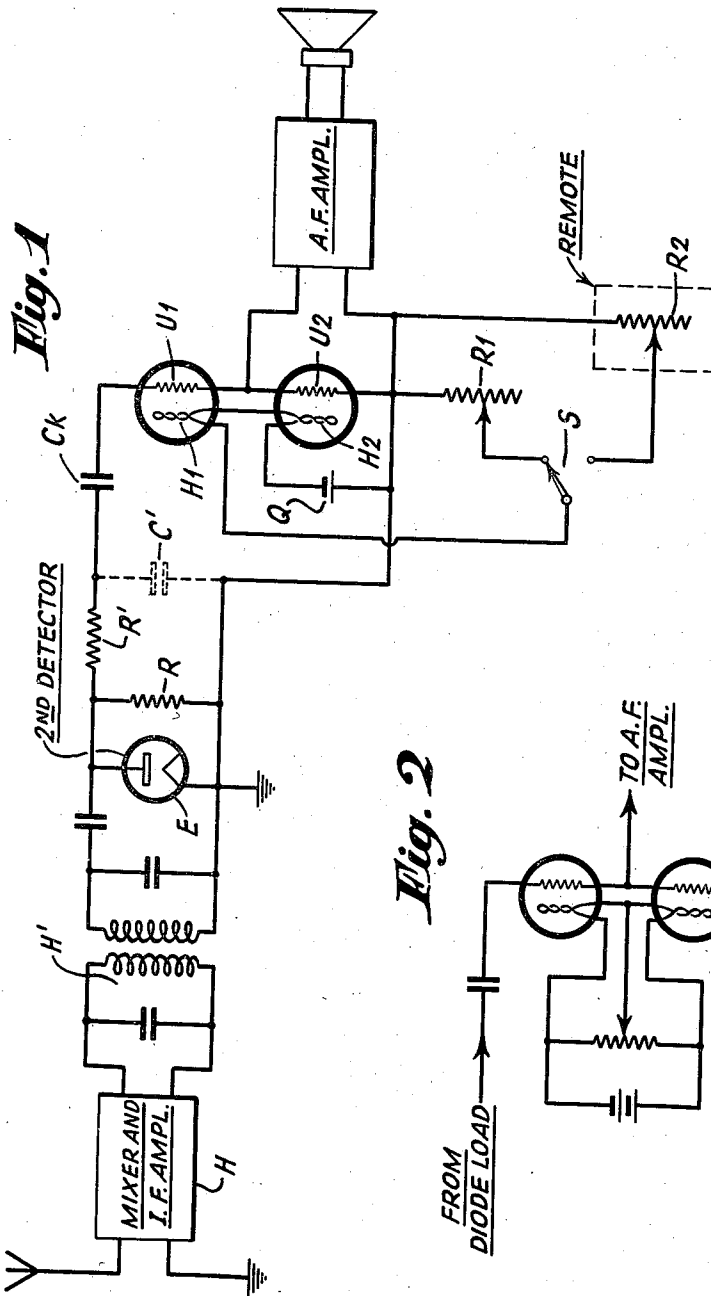
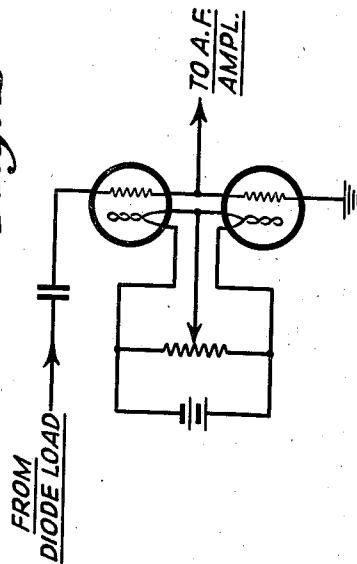


Fig. 2



BY

INVENTOR.
CURT HEINECKE

H.S. Swann
ATTORNEY.

UNITED STATES PATENT OFFICE

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RECEIVER VOLUME CONTROL

Curt Heinecke, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie, m. b. H., Berlin, Germany, a corporation of Germany

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10 Claims. (Cl. 250—20)

It is known in the art to use in a receiver apparatus comprising a diode for rectification an ohmic voltage divider in the form of a rotary resistance for volume regulation; the alternating potential output of the signal rectifier diode being impressed across the said resistance whose shiftable tap is connected with the control grid of the following audio amplifier tube.

The disadvantage of such an arrangement in the first place is that the slider, especially after long periods of use, will cause scratching noises and interruptions as a result of unavoidable oxidation on the contact surface. Another shortcoming is that the voltage divider may hardly be mounted anywhere else than at close proximity to the volume control knob. In fact, remote control is comparatively difficult, and will in most cases be accomplished only by the aid of a motor.

According to the present invention the voltage divider consists of two temperature-dependent, indirectly heated, series-connected resistances, the coils of which are traversed by regulatory currents in such a way that the total resistance of the voltage divider stays substantially unaltered in the course of regulation. The use of directly, or indirectly, heated resistances for volume control, to be sure, is fundamentally known in the art. However, the arrangement here disclosed offers a number of special advantages over circuits of this kind known in the earlier art. These advantages particularly may be seen to reside in the high aggregate resistance which will stay stable and constant also upon regulation, and in the wide regulation range. Inasmuch as each of the said two resistances may be adjusted to a very low value while the respective other resistance is adjusted to a very high resistance value, it is possible to feed to the audio amplifier practically the entire alternating potential furnished from the signal rectifier diode as well as a very small fraction of this potential. Since the total resistance incidentally does not vary at all, or only very slightly so, the alternating current load of the signal rectifier diode remains constant, and this particularly in the present case, contradistinct to amplifier tubes, is very important from the viewpoint of avoiding distortion. Crackling noises during regulation will not arise even after prolonged use of the apparatus. Inasmuch as the regulation is effected by a current, the mounting of the operating knob is independent of the arrangement of the voltage divider so that remote control means may be mounted in a simple way.

In the drawing:

Fig. 1 shows a receiver circuit embodying the invention,

Fig. 2 illustrates a modification.

Referring to the exemplified embodiment of the invention shown in Fig. 1, the part H of the re-

ceiver apparatus contains the radio frequency portion associated with the aerial. The network H includes the oscillator-mixing stage, and the usual I. F. amplifier, the latter has its output end H' connected with the signal rectifier diode E. The non-grounded end of the load resistance R of the diode is connected by way of a decoupling resistance R', which at the same time together with the line capacitance C' serves to filter the radio frequency currents, and the blocking condenser Ck with series-connected, indirectly heated, temperature-dependent resistances U₁ and U₂ consisting of uranium dioxide or the like. The point where these two resistances are joined is brought to the control grid of the first, or input, tube of the audio amplifier, while the lower end of resistance U₂ is connected with the grounded return.

The two heater coils H₁ and H₂ are connected in series with each other and a source of voltage supply Q, a terminal of the change-over switch S, and a variable resistance R₁ which is adjusted by the volume control knob of the receiver set to regulate the heating current. Of the said two resistances U₁ and U₂, one has a positive and the other one a negative temperature coefficient so that, upon variation of the joint heating current, the resistances will be varied in opposite senses, while yet the aggregate resistance remains practically constant.

For the purpose of remote control, the change-over, or double-throw, switch S is shifted into the position indicated by the dash line with the result that the regulating resistance R₂ is cut into the heating circuit, the said resistance R₂ being mounted at the remote control point. The lead may consist of a single conductor cable since the grounded lead to resistance R₂ may be represented by the grounded sheath of the cable.

In case that also the tuning is to be effected by remote control and that also other regulatory means of the receiver are to be remote controlled, the switch S may be mechanically interlocked with other switches for the purpose of effecting a change to remote operation. It will be understood that also volume control is feasible from several remote points.

Another scheme is to use similar or equivalent resistances for U₁ and U₂, the temperature coefficients of which are both positive or both negative, provided that the heating currents are regulated in contrary senses. As shown in Fig. 2, this is accomplished, for instance, by having the ends of the two heater windings which are not connected with each other, connected with the ends, or terminals, of a voltage source of supply, while the interconnected ends are brought to a shiftable tap of a voltage divider associated with the terminals of the source of voltage supply. The change from the conventional control to re-

mote control in this case may be effected by providing at the remote control point a voltage divider also connected with the terminals of the voltage supply source, and by connecting the ends of the heating coils which are here interconnected, by means of a change-over switch with a shiftable tap of this voltage divider.

What is claimed is:

1. In a receiving system of the type including a detector and an audio utilization network; the improvement which comprises at least two temperature-dependent resistor elements connected between said detector and utilization network, means independent of the signal currents in the receiving system for varying the temperatures of said elements, and said elements being chosen to present a substantially constant resistance magnitude across said detector over a wide range of temperature variation thereof.

2. In a receiving system of the type including a detector and an audio utilization network; the improvement which comprises at least two temperature-dependent resistor elements connected between said detector and utilization network, said utilization network having its input terminals coupled solely across one of the elements, means independent of the signal currents in the receiving system for varying the temperature of said elements, and said elements being chosen to present a substantially constant resistance magnitude across said detector over a wide range of temperature variation thereof.

3. In a receiving system of the type including a detector and an audio utilization network; the improvement which comprises at least two temperature-dependent resistor elements connected between said detector and utilization network, said elements being arranged in series across the detector output terminals, solely one of the elements being connected to the utilization network input terminals, means independent of the signal currents in the receiving system for varying the temperature of said elements, and said elements being chosen to present a substantially constant resistance magnitude across said detector over a wide range of temperature variation thereof.

4. In a receiving system of the type including a detector and an audio utilization network; the improvement which comprises at least two temperature-dependent resistor elements connected between said detector and utilization network, means independent of the signal currents in the receiving system for varying the temperature of said elements, and said elements being chosen of opposite temperature coefficients thereby to present a substantially constant resistance magnitude across said detector over a wide range of temperature variation thereof.

5. In a modulated carrier receiver, a demodulator having carrier input terminals and modulation voltage output terminals, a modulation voltage network having input terminals, a volume control device comprising a resistive path connected to said output terminals, said network input terminals being connected across a portion of the path, said portion and at least a second portion of the path being temperature-dependent resistive elements and means independent of the signal currents in the circuits of said receiver for regulating the temperatures of said elements.

6. In a modulated carrier receiver, a demodulator having carrier input terminals and modulation voltage output terminals, a modulation voltage network having input terminals, a volume control device comprising a resistive path connected to said output terminals, said network input terminals being connected across a portion of the path, said portion and at least a second portion of the path being temperature-dependent resistive elements, said elements being of opposite temperature coefficients, and means for regulating the temperatures of said elements.

7. In a modulated carrier receiver, a demodulator having carrier input terminals and modulation voltage output terminals, a modulation voltage network having input terminals, a volume control device comprising a resistive path connected to said output terminals, said network input terminals being connected across a portion of the path, said portion and at least a second portion of the path being temperature-dependent resistive elements, said elements being of like temperature coefficients, and means for regulating the temperatures of said elements in opposite senses.

8. In a modulated carrier receiver, a demodulator having carrier input terminals and modulation voltage output terminals, a modulation voltage network having input terminals, a volume control device comprising a resistive path connected to said output terminals, said network input terminals being connected across solely a portion of the path, said portion and at least a second portion of the path being temperature-dependent resistive elements, and means remote from the receiver and completely independent of the carrier and modulation voltage circuits of the receiver for regulating the temperatures of said elements.

9. In a modulated carrier receiver, a demodulator having carrier input terminals and modulation voltage output terminals, a modulation voltage network having input terminals, a volume control device comprising a resistive path connected to said output terminals, said network input terminals being connected across a portion of the path, said portion and at least a second portion of the path being temperature-dependent resistive elements, and means for regulating the temperatures of said elements, said last means comprising heater elements operatively associated with their respective resistive elements, and a control device in circuit with the heater elements for varying the energization thereof.

10. In a modulated carrier receiver, a demodulator having carrier input terminals and modulation voltage output terminals, a modulation voltage network having input terminals, a volume control device comprising a resistive path connected to said output terminals, said network input terminals being connected across a portion of the path, said portion and at least a second portion of the path being temperature-dependent resistive elements, and means for regulating the temperatures of said elements, said last means comprising heater elements operatively associated with their respective resistive elements, and a remote control device in circuit with the heater elements for varying the energization thereof.

CURT HEINECKE.