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VOLUME CONTROL CIRCUIT

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Fig. 1

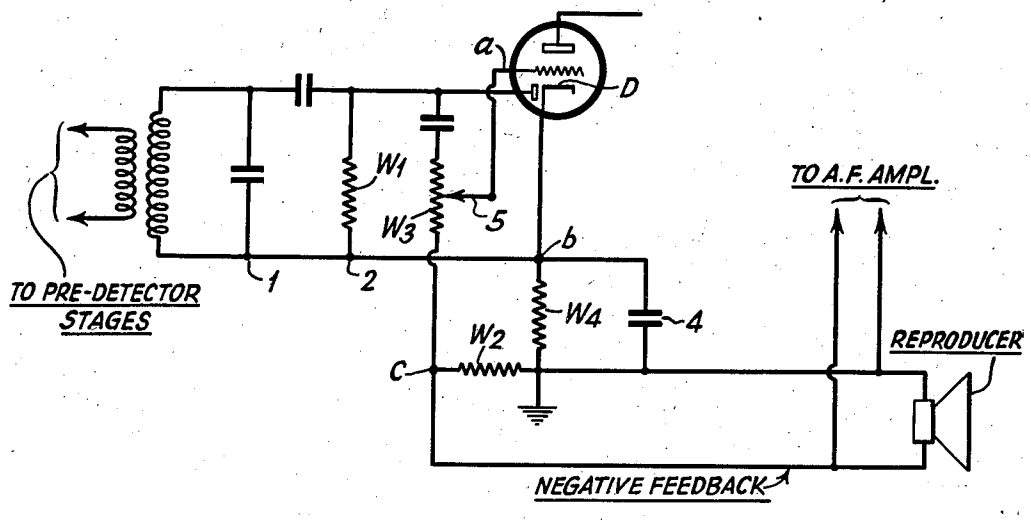
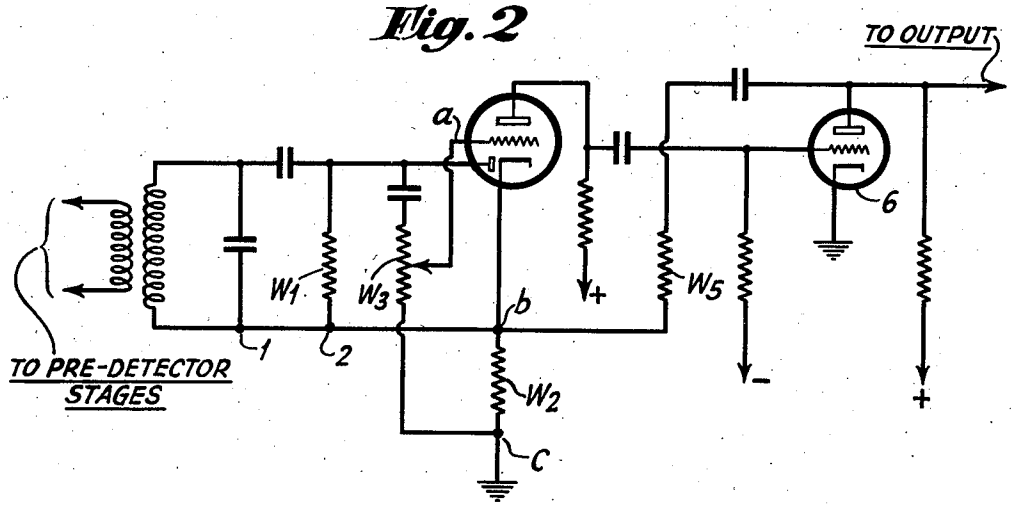


Fig. 2



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VOLUME CONTROL CIRCUIT

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2 Claims. (Cl. 250—20)

What has been disclosed heretofore is to interlock the gain regulation (volume control) and the control of the negative feedback of a receiver in such a way that when the volume control is in the position of low gain, the relationship between the negative feedback potential and the input potential of the portion of the receiver in negative regeneration is greater than in the position of the volume control corresponding to high gain. In such past embodiment the circuit is so designed that merely the volume control need be actuated in order to cause simultaneously also a change of the negative feedback in the above-mentioned sense by interlock or by positively acting means. This is insured by impressing the audio potential derived from a generator with low inner resistance upon a series arrangement comprising an unvariable resistance upon which the negative feedback potential is applied, and a voltage divider serving for gain or volume control, while the regulated audio potential is taken off at the junction of the negative feedback resistance and the portion of the voltage divider adjacent to the same. In such embodiment, the generator consisted of a diode whereby the incoming signal frequency (R. F.) is rectified. The load resistance of the diode in that scheme is designed to act as a voltage divider, and is connected in series with the invariable resistance upon which the negative feedback potential is impressed.

In the improved embodiment as here disclosed in which the negative feedback is regulated conjointly and simultaneously with the volume control, the generator with low inner resistance comprises the parallel connection of a diode rectifying the incoming R. F. signals and the corresponding load resistance. In this scheme, the grid leak of the next tube is designed to act as a voltage divider for volume control. In the first place, this offers the advantage that the volume control is free from roaring noises, for the reason that the grid leak is not traversed by a current. Another advantage is that the resistance of the parallel connection of the diode and the load resistance is lower than that of the diode alone so that, when the voltage divider is in the position of maximum gain, the voltage division of the negative feedback potential is such that the negative regeneration is still further cut down. As a matter of fact, this effect is still further promoted by using for the grid leak a higher resistance than for the load resistance of the diode, to the end of avoiding distortions.

The invention shall now be explained more fully by reference to the appended drawing wherein Figs. 1 and 2 show two modifications of the invention. Referring first to Fig. 1, the resistance W_4 which serves to produce the grid biasing voltage, may be assumed to be short-circuited inasmuch as it is shunted for audio by a condenser 4. The negative feedback potential fed to the resistance W_2, therefore, prevails between points *b* and *c*, and also across the series circuit comprising the resistance W_3 and the parallel arrangement of W_1 and the diode D. The negative feedback potential is taken off between points *a* and *b*, and it is therefore so much lower, the higher the position of the slide contact, or wiper, 5, of resistance W_3, and this is true when the gain is high. The circuit organization does not work in the desired sense if the connection 2—*b* is replaced by a lead 2—*c*.

Fig. 2 differs from Fig. 1 insofar as the resistance W_2 which is impressed with a negative feedback potential by way of resistance W_5 from the tube 6 next above, serves at the same time for producing the grid biasing voltage which, by the way, by means of another resistance shunted by a condenser, may be raised to a higher desired value. Also, in this case, there holds good what has been set forth in reference to the division of the negative feedback potential of Fig. 1. The circuit does not operate in the desired manner when the lower end of W_1 is connected with point *c* rather than with point 2. Moreover, it would not do either to replace the lead 2—*b* by the lead 2—*c*. On the other hand, it is possible to replace the lead 1—2 by 1—*c* since the oscillation circuit is not to be regarded as an audio generator.

What is essential in both circuits is the fact that in parallel relation to the points *b* and *c*, there is the series connection of W_3 and the parallel combination of W_1 and the diode.

What is claimed is:

1. In combination with a diode detector having a signal input circuit and a load resistor across which audio voltages are developed, said load resistor shunting said diode, an audio amplifier tube having at least a control grid, cathode and output electrode, an adjustable impedance means coupling said resistor and grid, said impedance means comprising a condenser in series with a resitive element both connected across said load resistor, an audio voltage utilization path coupled to the output electrode, said diode being composed of an auxiliary anode associated with the said cathode, a negative feedback path between said utilization path and said impedance means, a resistive impedance in the space current

path of said tube for developing a bias voltage for the grid, and means comprising said resistive element of said adjustable impedance means for impressing said bias voltage on said grid.

2. In combination with a tube provided with at least a cathode, an output electrode, a signal grid and an auxiliary anode adjacent the cathode to provide a diode, a modulated signal input circuit coupled to the anode and cathode, a load resistor operatively associated with the anode and cathode and developing modulation voltage thereacross, a grid bias resistor in the space current path of the tube and having an end thereof connected to the cathode, a modulation utilization network coupled to the output electrode, an adjustable impedance means coupling said load resistor to said grid, said impedance means comprising a resistive element connected between the grid and a point of the bias resistor which is negative relative to the cathode, a negative feedback path between said utilization network and said impedance means, said impedance means consisting of a condenser in series with said resistive element, and said load resistor shunting the said diode.

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