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RATIO DETECTOR CIRCUIT FOR FREQUENCY-MODULATED OSCILLATIONS

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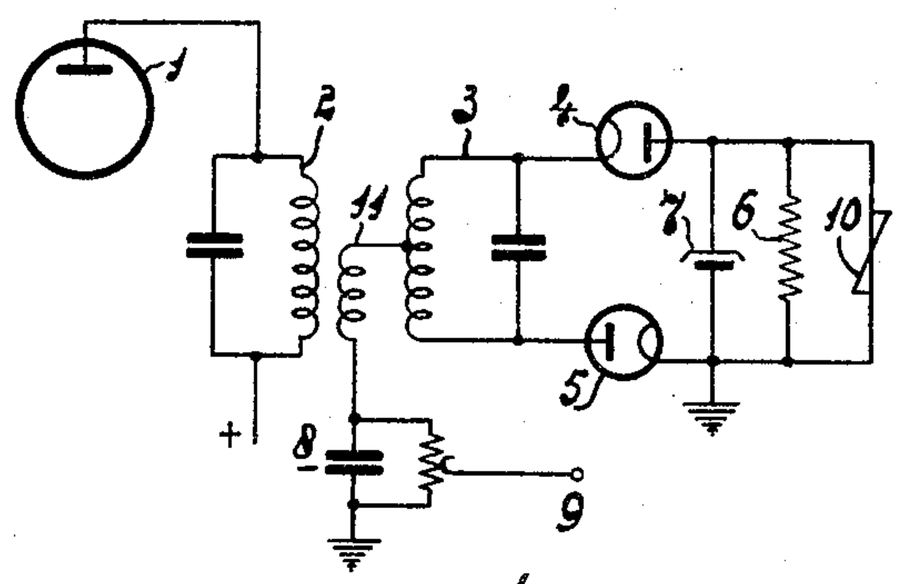

Fig. 1

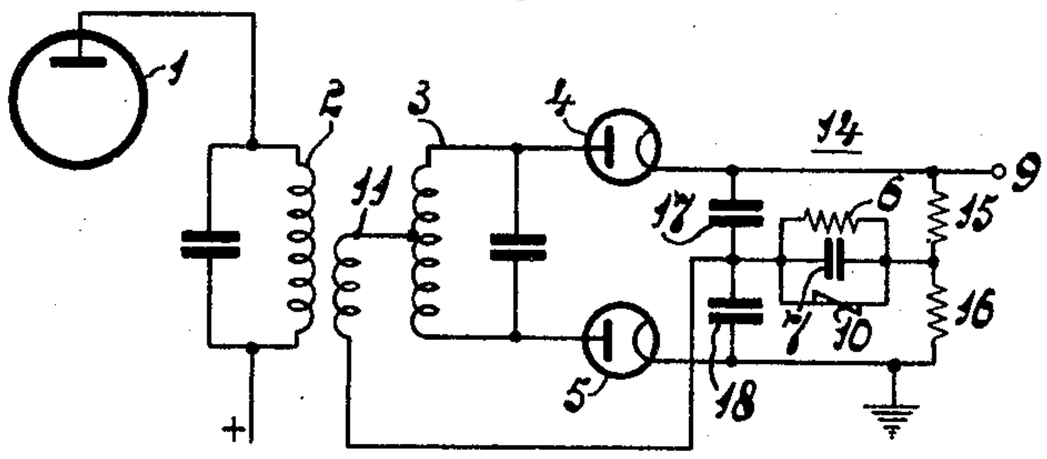

Fig. 2

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RATIO DETECTOR CIRCUIT FOR FREQUENCY-MODULATED OSCILLATIONS

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1 Claim. (Cl. 250—27)

This invention relates to a circuit for demodulating frequency-modulated oscillations by means of a ratio-detector of the type comprising two coupled circuits, two rectifiers and an RC-filter which offers substantially a short-circuit to the modulation frequencies. Its particular object is to improve in a simple manner the characteristic curve of a frequency-detecting circuit of the said kind on reception of larger input amplitudes.

According to the invention the said RC-filter comprises a VDR-resistor.

The term VDR-resistor is to be understood to mean a resistor body, the resistance of which greatly decreases with increasing voltage irrespective of the direction of the voltage impressed. The material used to constitute such a resistor is frequently silicon carbide.

In order that the invention may be clearly understood and readily carried into effect it will now be described with reference to the accompanying drawing, in which two embodiments are given by way of example.

Referring to Fig. 1, the frequency-modulated input oscillations produced across the anode circuit of a tube 1 and required to be demodulated are fed via two circuits 2 and 3, which are about critically coupled and tuned to the input frequency, to two rectifiers 4 and 5 opposite in conductive direction, the output of which includes an RC-filter comprising a resistor 6 and a capacitor 7 and offering substantially no resistance to the modulation frequencies. Via a coil 11 tightly coupled to the inductance of the primary circuit 2 the midpoint of the secondary circuit 3 is connected to a detector-output filter 8 so as to permit the demodulated oscillations to be abstracted from an ouput terminal 9.

As a rule, a ratio detector exhibits full limiting only for a given value of the mean input amplitude.

According to the invention a VDR-resistor 10 is connected in parallel with the RC-filter 6, 7. Such a resistor has a characteristic curve which may be reproduced approximately by the formula $V=Ci^{\beta}$, where V designates the voltage across the resistor, i the current passing through the resistor and C and β designate constants. The values C are widely differing for the various types in which the said resistors are to be had. The value of β ranges about between 0.2 and 0.35.

If the input voltage across the circuit 2 is still so small that at the corresponding voltage at the smoothing filter 6, 7 the resistance of the VDR-resistor 10 is high as compared with that of the resistor 6, the influence of the VDR-resistor 10 is substantially nil. However, if with increasing input signal the voltage at the smoothing filter 6, 7 is such that the resistance of the VDR-Resistor 10 is of the same order as that of the resistor 6, a supplementary damping of the circuits 2 and 3 occurs via the rectifiers 4 and 5. This results in the distortion of the demodulated signal at the terminal 9 being reduced despite different values of mean input amplitude, while the ratio detector continues to present a satisfactory limiting effect.

Fig. 2 shows a known modification of the ratio detector of Fig. 1, the rectifiers 4 and 5 having the same conductive direction and their output including a detector filter 14 comprising two resistors 15 and 16 and two capacitors 17 and 18, the points of connection to which are connected via the above described RC-filter 6, 7 which according to the invention, has the VDR-resistor 10 connected in parallel therewith. The other reference numerals designate like circuit elements as in Fig. 1.

What is claimed is:

A ratio detector for demodulating frequency-modulated oscillations comprising first and second resonant circuits in coupled relationship, means connected to supply said oscillations to said first resonant circuit, a pair of series-connected capacitors, a first diode having an anode connected to one end of said second resonant circuit and a cathode connected to one end of said series-connected capacitors, a second diode having an anode connected to the other end of said second resonant circuit and a cathode connected to the other end of said series-connected capacitors, a pair of series-connected resistors connected in parallel with said pair of series-connected capacitors, a coil coupled to said first resonant circuit and connected at one end to said second resonant circuit, the other end of said coil being connected to the junction between said pair of series-connected capacitors, a resistance-capacitance filter for by-passing modulation frequencies, said filter comprising a resistor and a capacitor connected in parallel combination, said combination being connected at one end to said capacitor junction and at the other end to the junction between said pair of series-connected resistors, said filter further including a voltage-responsive resistor the resistance of which decreases in response to increased applied voltage and increases in response to decreased applied voltage regardless of the polarity of the applied voltage, said last-named resistor being connected in parallel with said parallel combination, and an output terminal coupled to the cathode of said first diode.

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