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SAWTOOTH CURRENT OSCILLATION GENERATOR

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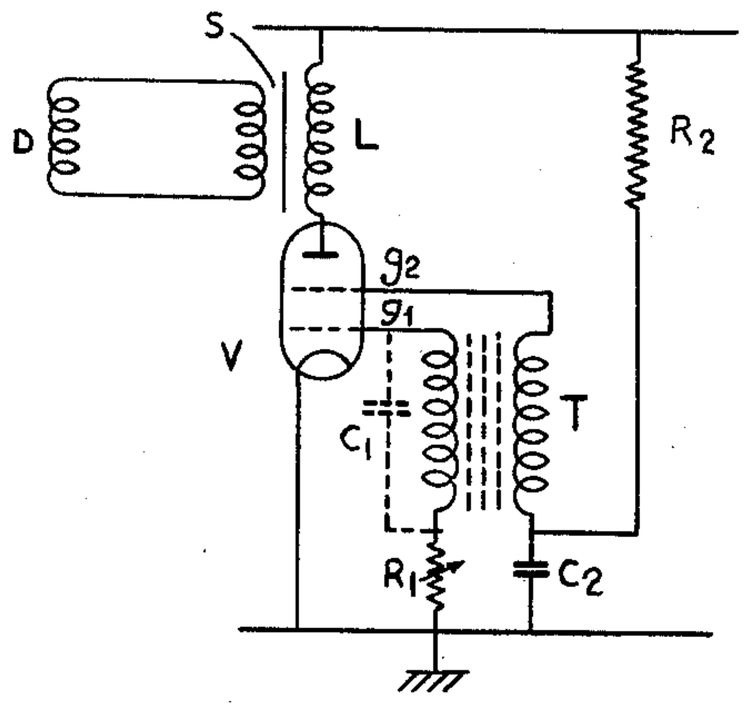

Fig. 1.

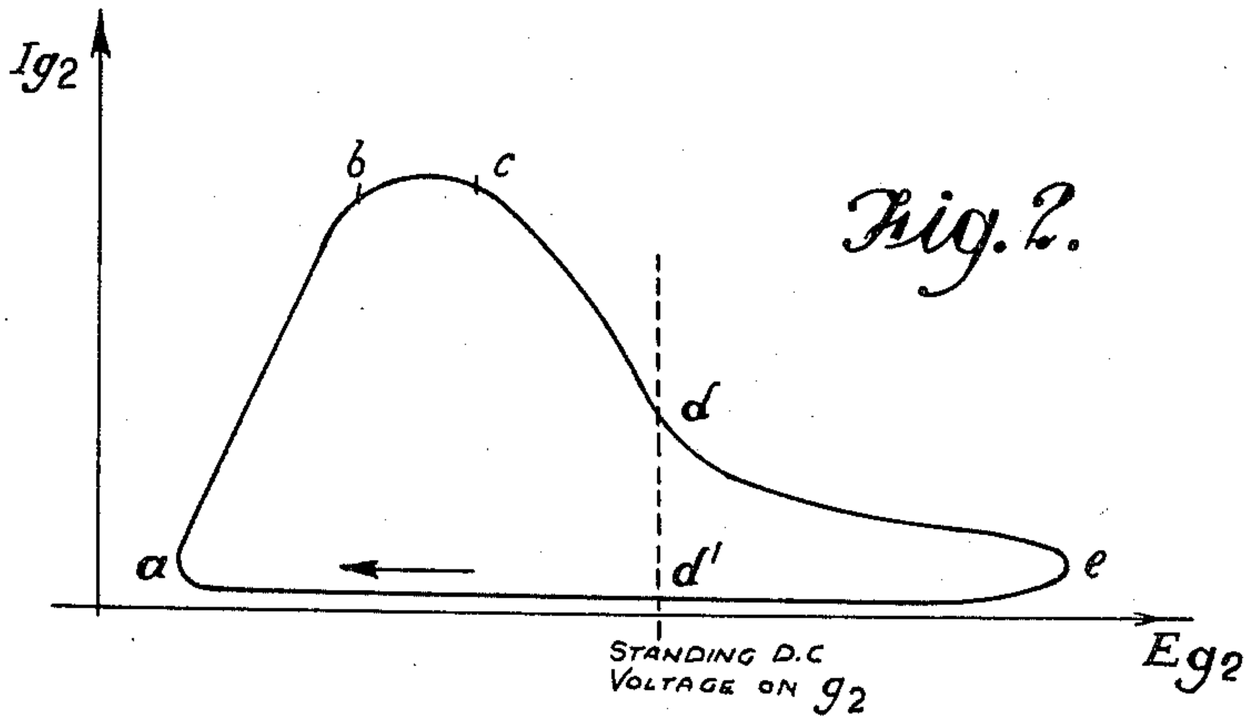

Fig. 2.

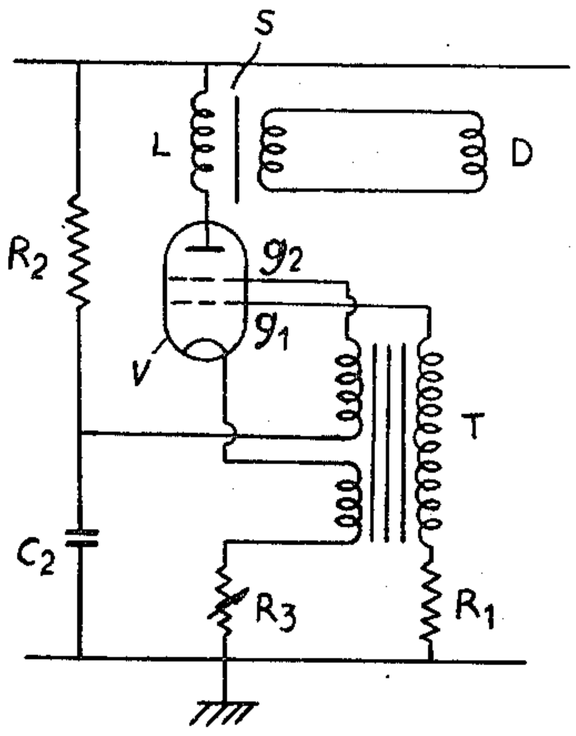

Fig. 3.

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SAW-TOOTH CURRENT OSCILLATION GENERATOR

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3 Claims. (Cl. 250—36)

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The present invention relates to a sawtooth current oscillation generator employing a single valve which serves the dual purpose of generating of sawtooth current oscillations and as an amplifier thereof.

This invention is directed to the linearisation of the oscillations in a single valve sawtooth current oscillation generator in which a substantially sawtooth current is produced in a network composed mainly of inductances.

The invention will be more clearly understood with reference to the accompanying drawings, in which

Figure 1 shows a basic circuit diagram of a sawtooth current generator;

Figure 2 shows a graph and

Figure 3 shows a circuit arrangement according to the invention.

In order to produce a sawtooth current in a network composed only of inductances it is necessary to apply a periodically interrupted constant voltage to the terminals thereof. Figure 1 shows a circuit arrangement for this purpose, which is suitable for producing the line oscillations in television receiving apparatus.

The circuit comprises a multi-grid valve V having two electrodes *g*1, *g*2 arranged between the cathode and anode, an inductance L being connected in the anode lead in which the amplified sawtooth oscillations are produced. The inductance L may comprise the primary winding of the line scan transformer S, the secondary of which is connected to the line deflecting coils D of the cathode ray tube.

The transformer T provides a positive feedback between the two grid electrodes *g*1, *g*2. If the feedback is tight the dynamic characteristics of the grid volts (E*g*2) to grid current (I*g*2) of the grid *g*2 will be as shown in Figure 2. This shape of characteristic, especially as regards the sections *ab* and *bc*, may be easily produced by employing a suitable transformer ratio and tightness of coupling. Between the points *a* and *b* the impedance of the electrode *g*2 is positive and thus I*g*2 increases with E*g*2. At point *b* the impedance increases quickly to infinity and I*g*2 remains substantially constant with increase of E*g*2. The duration of the portion *bc* is determined by the inductances and resistances in the circuit and the biases on the different electrodes.

At point *c* the impedance of electrode *g*2 becomes negative, and that section of the circuit begins to oscillate. The voltage of electrode *g*2 increases quickly and that of electrode *g*1 decreases until it finally cuts off the flow of electrons in the valve. The frequency of these oscillations is determined by the capacity C1 across the primary and secondary of the transformer T produced by the inter-electrode capacities of the valve and the self-capacities of the transformer T. The frequency may be controlled by variations of the resistance R1.

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During the period of the *d'abcd* portion of the complete cycle, the potential on electrode *g*1 is more positive than the cathode or established bias voltage. The resistance R2 and condenser C2 serve to adjust the voltage on the electrode *g*2 to the correct value, as the impedance on *g*2 is positive, and the voltage on *g*1 is positive, and the valve is conducting.

By correct adjustment the section *ab* may be made very steep so that I*g*2 suddenly rises to a high value and remains constant. As the voltage on electrode *g*2 increases, that on electrode *g*1 decreases and changes the impedance of the anode circuit.

The above mentioned action of the theoretical circuit does not take into account the resistance elements in the inductances or the internal impedance of the valve.

In order to prevent an increase of the anode impedance due to the decrease in voltage of electrode *g*1, a third winding is, as shown in Figure 3, introduced on the feed back transformer T and connected in the cathode circuit in such a way that the potential changes on the electrode *g*1 are followed by that on the cathode. This further increases the potential difference between the cathode and electrode *g*2, and partly counteracts the effects of finite resistances in the anode circuit. In order to prevent unwanted ringing in the anode circuit, a diode may be connected in various ways in that particular part of the circuit. In the circuit shown in Figure 3 the resistance R3 may be used as a frequency control.

The frequency of the oscillations generated by either embodiment may be synchronised by the application of negative pulses to the electrode *g*1 or positive pulses to the electrode *g*2.

We claim:

1. A sawtooth current oscillation generator comprising a valve having at least two grid electrodes between the cathode and the anode, a source of high tension supply, a transformer having three mutually coupled windings, that one of the said two grids nearer to the cathode being connected to the negative high tension supply through one of said windings, the other grid of the valve being connected to the high tension

positive supply through a second winding on said transformer and a series resistance, a condenser connecting the point of junction of said resistance and said second winding to a point of fixed potential, said first and second windings being coupled to provide positive feed back between said grids, the cathode of the valve being connected through the third winding on the transformer to the negative high tension supply, said third winding being coupled to the other windings to apply potentials to the cathode in the same sense as the potentials on the grid electrode nearer to the cathode and an output circuit connected between the anode and the high tension positive supply.

2. A generator according to claim 1, having a variable resistance included in the connection between the cathode and ground to provide a variable frequency control.

3. A generator according to claim 1, having a resistance included in the connection from the grid electrode nearer to the cathode to ground.

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