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MEANS FOR GENERATING ELECTRIC OSCILLATIONS OF HIGH FREQUENCY

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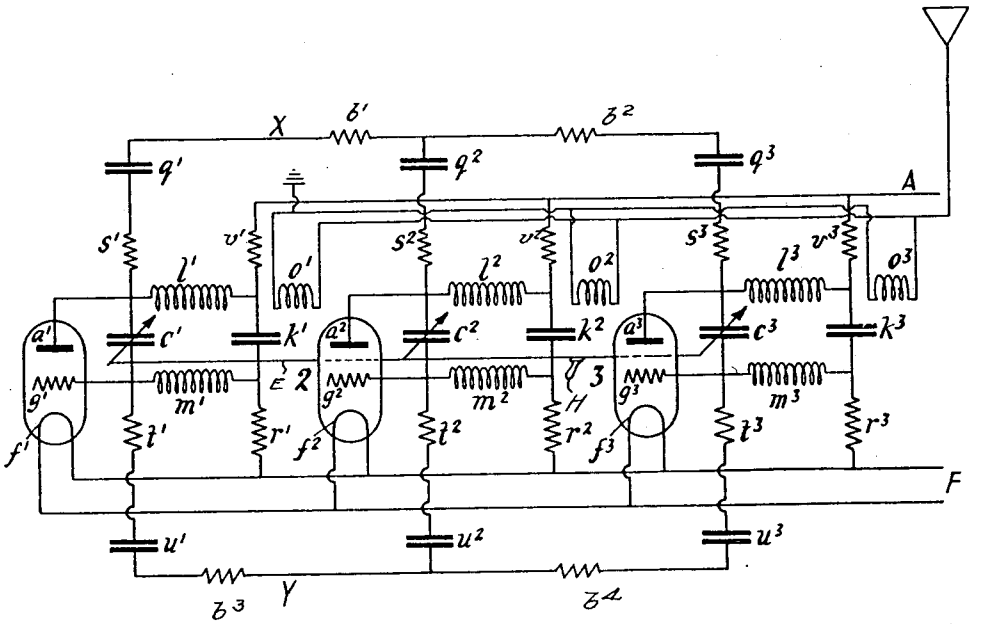

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MEANS FOR GENERATING ELECTRIC OSCILLATIONS OF HIGH FREQUENCY.

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This invention relates to means for generating electric oscillations of high frequency, its main object being to enable a high power to be obtained with very short waves, say, of a wave length of 100 metres or less.

When in the production of short waves several thermionic valves are connected in parallel to an oscillatory circuit difficulties arise owing to the length of the necessary leads to the grids and anodes, and a limit to the number of valves which can effectively be employed is soon reached, these difficulties increasing as the wave length decreases.

According to this invention I employ more than one oscillatory circuit and connect these circuits in parallel. Preferably a separate circuit is employed for each valve but it may in some cases be possible to connect two or even more valves in parallel to each circuit. I have found that any number of circuits can thus be associated together and so the power can be increased as desired. Preferably the circuits are arranged in a line and are connected to common bars through condensers and resistances, the latter being introduced in order to prevent the occurrence of oscillations in any subsidiary circuits thus formed.

Preferably each oscillatory circuit comprises two inductances and two condensers, one of which is adjustable for tuning purposes. These tuning condensers may conveniently be adjusted by some common mechanism so that all the circuits can be tuned simultaneously.

The filaments of all the valves are conveniently connected to common heating leads and the anodes may be conveniently connected to common high tension mains through resistances which tend to equalize the currents taken by the different valves, and automatically correct for small inequalities between the valves.

Each grid is also preferably connected to its filament through a suitable resistance.

The invention is illustrated by the accompanying diagram, which shows three valves, each with its own oscillatory circuit, connected up in parallel. 1, 2 and 3, are three valves having anodes, grids and filaments a^1, g^1, f^1, a^2, g^2, f^2 and a^3, g^3, f^3, respectively. Each of these valves is connected to an oscillation circuit, the circuit connected to valve 1 comprising inductance coils l^1, m^1, blocking condenser k^1 and adjustable tuning condenser c^1, similar circuits being connected to valves 2 and 3. The movable parts of condensers c^1, c^2, and c^3 may be connected together for unicontrol by any suitable means, a rod E having a suitable operating handle H being shown for this purpose.

The filaments are connected to common filament busbars F, and the power is supplied to the anode side of the blocking condensers k^1, k^2 and k^3, through suitable resistances v^1, v^2, v^3, from a common high tension busbar A. The grid potential of the valves is controlled by connecting the grid side of the blocking condensers k^1, k^2, and k^3, through resistances r^1, r^2, r^3, and if necessary a potentiometer to one of the filament busbars.

Each oscillation circuit is preferably provided with its own coupling coil to the aerial o^1, o^2, o^3, and these coils can all be connected in parallel in the aerial circuit.

To ensure all the oscillation circuits working in synchronism it is necessary that they should all be connected to common coupling bars X, Y, through resistances and condensers. The anode side of each circuit is connected to a bar X through coupling resistances s^1, s^2, s^3, and condensers q^1, q^2, q^3, while the grid side of each circuit is connected to a bar Y through coupling resistances t^1, t^2, t^3, and condensers u^1, u^2, u^3.

These condensers are in the nature of blocking condensers and their function is to prevent any direct current passing between the valves. The function of the coupling resistances is to prevent oscillations occurring in the circuits formed by any two valves and the coupling bars; should these resistances be too small, oscillation may start between two valves through the coupling bars, and this will prevent the circuits paralleling properly and will very likely damage the valves, while if the resistances are too large the coupling bars will not be able to maintain the circuits in synchronism.

In cases where the length of the coupling bars X Y becomes an appreciable fraction of the wave length employed, it is also advisable to insert resistances b^1, b^2, b^3, b^4 in the bars at points intermediate between the connections to the circuits, the object being to prevent longitudinal oscillations occurring in the system. Choke coils may be inserted

at a number of points in the anode busbar and the filament busbars to prevent longitudinal oscillations.

I have found that lamps are a very useful form of resistance to employ for these coupling resistances as any inequalities occurring in the circuits at once become apparent from the unequal lighting of these lamps.

The oscillatory circuits thus connected together, while consisting of a number of similar circuits, form in effect one distributed circuit which is symmetrical as regards the valves.

The various oscillatory circuits should be as nearly as possible in tune but they need not be exactly in tune.

Having described my invention what I claim is:—

1. A high frequency generator system comprising a plurality of oscillation generating means, a plurality of energy supply leads connecting said generators in parallel, means therein comprising resistive means for preventing parasitic oscillations and means comprising circuits containing capacitance and resistance for maintaining synchronism between the oscillations of said generators.

2. A high frequency generator system comprising a plurality of oscillation generating means, a plurality of energy supply leads connecting said generators in parallel, means therein comprising resistive means for preventing parasitic oscillations, means comprising circuits containing capacitance and resistance for maintaining synchronism between the oscillations of said generators, and means adapted to combine the oscillations from said respective generators into a single output.

3. A high frequency generator system comprising a plurality of triode oscillators, each of said triodes having separate circuits connected to its cathode, anode and grid for generation of oscillations, separate means for tuning each of said oscillation circuits, means for simultaneously varying the tuning of said oscillation circuits to a desired frequency and a common output circuit coupled to all of said oscillation circuits.

4. A high frequency generator system comprising a plurality of triode devices, a plurality of oscillating circuits respectively independently connected thereto for the production of oscillations, a pair of current leads connecting the cathodes of said triodes for simultaneous energization, a current lead connecting said anodes respectively in parallel, an impedance inserted between said lead and each triode whereby the anode currents are equalized, means for controlling the bias of the respective grids of said triodes, and means for maintaining synchronism in the oscillations produced by said respective triode and circuit combinations.

5. A high frequency generator system comprising a plurality of combinations of a triode and an oscillating circuit, means for supplying energy simultaneously thereto from a single source, said means including elements adapted to equalize the energy supplied to each triode and means for maintaining synchronism between the oscillations of the respective combinations.

6. A high frequency generator system comprising a plurality of triode oscillators and separate oscillation circuits for each of said triodes, a common source of current connected to the anode of each of the triodes and a separate resistance connected from said common source to each of said anodes for preventing parasitic oscillations.

7. A high frequency generator system comprising a plurality of triode oscillators, each of said triodes having separate oscillation circuits and means for connecting the anodes of said oscillators in parallel, said means including a resistance and a condenser in the anode lead, whereby the generation of oscillations by said triodes is maintained in synchronism.

8. A high frequency generator system comprising a plurality of triodes, a common source of current for the anodes of said triodes, a separate resistance connected between said common source and each of said anodes, a separate feed back oscillation circuit for each of said triodes for producing the generation of oscillations, each of said oscillation cirucits including an inductance connected between the anode and the respective resistances.

9. A transmitting system comprising a plurality of high frequency generators, a plurality of oscillation circuits respectively connected thereto, a circuit connecting said generators and oscillation circuits in parallel for maintaining synchronism in the generator and circuit combinations, said circuit including an impedance between each pair of generators whereby longitudinal oscillations within the system are prevented.

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