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ULTRAHIGH-FREQUENCY CIRCUIT-ARRANGEMENT COMPRISING A DISCHARGE TUBE

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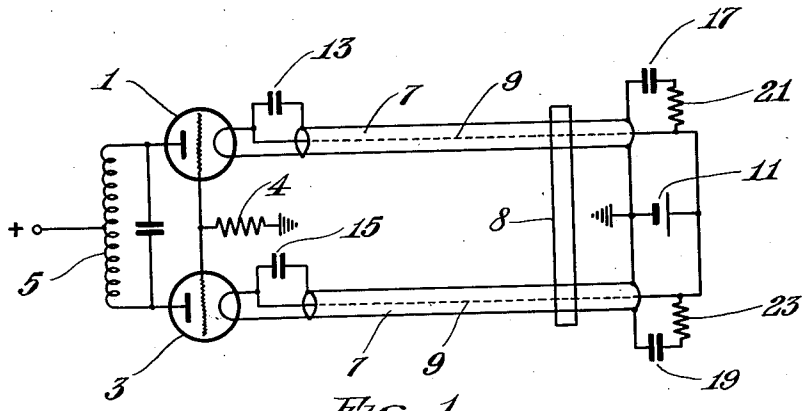

Fig. 1.

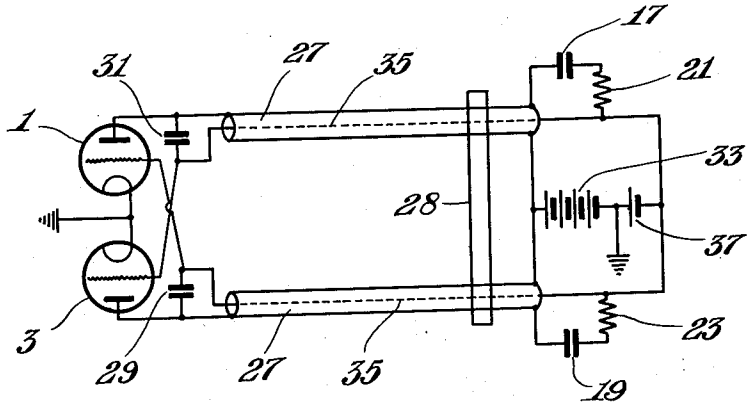

Fig. 2.

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ULTRAHIGH-FREQUENCY CIRCUIT ARRANGEMENT COMPRISING A DISCHARGE TUBE

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3 Claims. (Cl. 250—36)

1

The invention relates to an ultrahigh-frequency circuit arrangement comprising a discharge tube, wherein a supply voltage is supplied to an electrode through the intermediary of a conductor which is located in proximity of a second conductor, which is traversed by a high-frequency current, wherein the two conductors are connected to one another at the end located close to the electrode via a condenser of low impedance for voltages of high- and ultrahigh-frequency and form in electrical respect a unit exclusively for voltages of such frequencies.

In one form of construction of the said circuit-arrangement the two conductors are connected to the two current supply terminals respectively of a directly heated cathode which has a high-frequency alternating voltage with respect to earth.

It has been found in practice that, frequently at determined frequencies, losses occur in this circuit-arrangement. The object of the present invention is to eliminate these losses.

According to the invention, this object is attained by closing the transmission line formed by these two conductors at the end remote from the electrode via a separating condenser by means of a resistance whose value approximately corresponds to the surge impedance of the line.

The invention is based on the recognition that the impedance of the transmission line formed by the two conductors may have such an inductive value that the circuit formed by this inductive impedance and the condenser which connects the conductors to the end close to the electrode is tuned to a frequency located in the frequency range utilized. Instead of the very low capacitative impedance of the said condenser, there occurs in this way for this frequency between the said ends an ohmic impedance which may give rise to losses. By closing the line by means of its surge impedance, the impedance at the other end is always an ohmic impedance, so that the resonance with the condenser is excluded.

The invention will be explained more fully with reference to the accompanying drawing, which represents, by way of example, two forms of construction of a circuit-arrangement according to the invention.

Fig. 1 is a schematic diagram of a first embodiment of a high-frequency oscillator incorporating the invention, and

Fig. 2 is a schematic diagram of a second embodiment of a high-frequency oscillator incorporating the invention.

The circuit-arrangement shown in Fig. 1 serves

2

to generate high-frequency oscillations and comprises two tubes 1 and 3, which are connected in push-pull and which comprise directly heated cathodes; the grids of these tubes are connected to one another and, via a leakage resistance 4, to earth. Between the anodes of the two tubes is connected an oscillatory circuit 5 tuned to the frequency to be generated, whilst for the oscillations to be generated the cathodes are each connected to a point of a capacitative potentiometer located in parallel to the circuit and formed by the capacities of the tubes. In order to prevent part of the circuit from being short-circuited, a lecher wire system is connected between the cathodes of the tubes 1 and 3, which cathodes have a high-frequency voltage with respect to earth. This system consists of two lecher wires 7 whose ends which are not connected to the cathodes are interconnected and earthed. The lecher wire system 7, 7 may be tuned by means of a slidable short-circuiting bridge 8.

For the supply of the required heating current to the cathodes of the two tubes the lecher wires 7 traversed by high-frequency current are made hollow and each of them encloses a wire-shaped conductor 9 which is insulated from the wire. These conductors are respectively connected to that current supply terminal of a cathode which is not connected to a lecher-wire. Between the ends of the conductors 7 and 9 which are remote from the cathode is connected a source of heating current 11, so that the required heating current is supplied to the cathodes via the conductors 7 and 9. In order to promote that the conductors 7 and 9, which are located in close proximity to one another, should form in electrical respect a unit for the frequency of the oscillations to be generated, so that as far as possible the cathode has at every point the same high-frequency voltage, condensers 13 and 15, which have a low impedance for the oscillations to be generated, are connected between those ends of the conductors 7 and 9, respectively, which are connected to the same cathode.

If, however, the frequency of the oscillations to be generated is varied, it may occur that the impedance of at least one of the two transmission lines formed by the conductors 7 and 9 has such an inductive value that the parallel resonance circuit formed by this inductive impedance and the condenser 13 or 15 is tuned to the frequency of the oscillations to be generated, owing to which, instead of the very low capacitative impedance of the condenser 13 or 15 there occurs for the said frequency between the current sup-

ply terminals of the cathode of the tube 1 or 3 an ohmic impedance which gives rise to losses since a high-frequency voltage which may occur between those ends of the conductors 7 and 9 which are connected to a cathode causes a high-frequency current through the ohmic impedance present between these ends, which causes losses.

According to the invention, these losses are avoided by closing the the twin conductor lines formed by the conductors 7 and 9 at the end remote from the cathode via separating condensers 17 and 19 respectively by means of resistances 21 and 23 respectively, whose values substantially correspond to the surge impedance of the line, the impedance of the line at the end close to the cathode being in this case always an ohmic impedance, so that resonance with the condensers 13 and 15 respectively is excluded.

Fig. 2 represents a form of construction of a circuit-arrangement according to the invention, which also serves for the generation of oscillations. In this circuit-arrangement a lecher-wire system tuned to the frequency of the oscillations to be generated and consisting of conductors 27 and a short-circuiting bridge 28 is connected between the anodes of the tubes 1 and 3; whilst the grids of the tubes 1 and 3 are connected, via condensers 29 and 31 respectively of low impedance for the oscillations to be generated, to the anodes of the tubes 3 and 1 respectively. The cathodes of the tubes 1 and 3 are connected to one another and earthed. The direct-current voltage required for the anodes of the tubes is supplied by a source of voltage 33 which is connected on the one hand to the lecher-wires 27 and, on the other hand, to earth. A bias voltage which is negative with respect to earth is supplied to the grids of the tubes 1 and 3 by conductors 35 which are enclosed by the lecher-wires 27, which are traversed by high-frequency current, and which are connected to a source of bias voltage 37.

According to the invention, in the circuit-arrangement described so far the two transmission lines formed by the two conductors 27 and 35 are closed at the end remote from the tubes 1 and 3 via separating condensers 17 and 19 respectively by means of resistances 21 and 23 respectively, whose values approximately correspond to the surge impedance of the line 27, 35. It is thus prevented that between the anodes of at least one of the tubes and the grid of the other tube there occurs at determined frequencies of the oscillations to be generated a high-frequency loss of voltage, which gives rise to losses.

What I claim is:

1. A high frequency device comprising a pair of electron discharge tubes each having a directly heated cathode, a grid and an anode, the grids of said tubes being interconnected, a parallel-resonant circuit connected between the anodes of said tubes, a source of cathode voltage for said tubes, a pair of coaxial transmission lines each connected between said source and a respective cathode of said tubes, said lines being juxtaposed in parallel relation, a first pair of condensers having a low impedance for high frequencies, each of said first condensers being shunted across the cathode end of one of said lines, a second pair of condensers having a low impedance for high frequencies, a pair of resistances each connected in series with one of said second condensers across the other end of one of said lines, said resistances having an ohmic value substantially equal to the surge impedance of said lines, and a shorting bar transversely disposed across the outer conductors of said lines.

2. A high frequency device comprising a pair of electron discharge tubes each having a cathode, a grid and an anode, the cathodes of said tubes being interconnected, a source of potential, a pair of coaxial transmission lines connected respectively between the ends of said source and the anode of one of said tubes and the grid of the other tube, said cathodes being connected to an intermediate point in said source, a first pair of condensers having a low impedance for high frequencies, each of said first condensers being shunted across the anode end of one of said lines, a second pair of condensers having a low impedance for high frequencies, a pair of resistances each connected in series with one of said second condensers across the other end of one of said lines, said resistances having an ohmic value substantially equal to the surge impedance of said lines, and a shorting bar transversely disposed across the outer conductor of said lines.

3. A high-frequency circuit comprising a pair of electron discharge tubes having an electron-emissive electrode, a grid electrode and an anode electrode and terminals for said electrodes, a transmission line formed by two coaxial conductors disposed in parallel relation, each coaxial conductor including an outer lead and an inner lead, the outer leads of said conductors being connected to one pair of corresponding electrode terminals in said tubes, the inner leads of said conductors being connected to another pair of corresponding terminals in said tubes, means to apply an operating potential through said outer leads to the electrodes connected thereto, a first pair of condensers presenting a low impedance to high-frequencies, each of said first condensers being shunted across the leads at the terminal end of a respective coaxial conductor, a second pair of condensers having a low impedance to high-frequencies, and a pair of resistances each connected in series with one of said second condensers across the leads at the other end of a respective coaxial conductor, said resistances having an ohmic value substantially equal to the surge impedance of said coaxial conductors.

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