

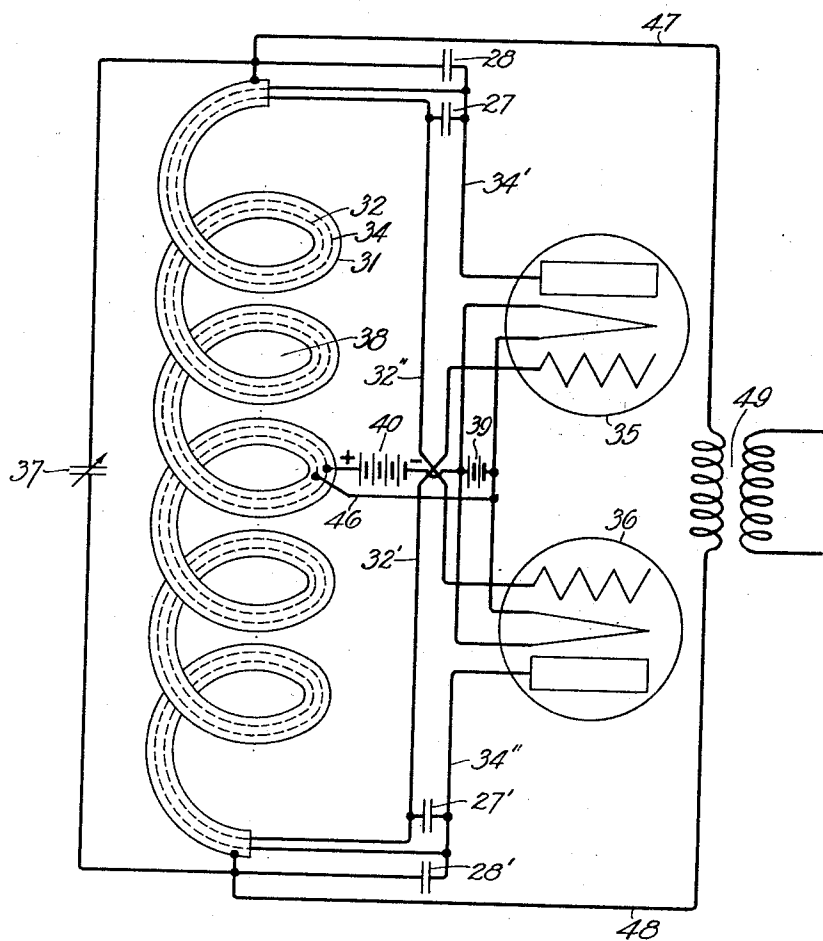
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1,795,648

HIGH FREQUENCY OSCILLATION GENERATOR

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HIGH-FREQUENCY-OSCILLATION GENERATOR

Original application filed April 26, 1926, Serial No. 104,619. Divided and this application filed April 3, 1928. Serial No. 267,086.

This invention relates to the generation of high frequency oscillations and more particularly to an oscillating system including space discharge devices associated with a tuned frequency determining circuit in a manner to effect stable operation at the resonant frequency of the determining circuit.

The invention provides a system including a plurality of space discharge devices associated with a frequency determining circuit having characteristic features which make it particularly adaptable to the production of high frequency oscillations, especially those used in short wave radio systems. Its use in a short wave radio receiver is described and claimed in application Serial No. 104,619 for "electric wave translating systems", filed April 26, 1926, by applicant, of which the present application is a division.

An object of the invention is to produce oscillations of high frequency, including the frequencies commonly used in short wave radio systems.

A feature of the invention relates to an inductance coil having a multiplicity of conductors, one of which comprises a tube that encloses the others.

In oscillating systems involving a plurality of space discharge devices, there is a marked tendency to "sing" at undesired frequency due to the inductance and capacity of the large number and the length of leads connecting the various elements of the circuit with the electrodes of the discharge devices. As the frequency increases this tendency becomes more noticeable and detrimental. In the short wave frequency range, where the frequency may be of the order of 50 megacycles or higher, such effects are quite serious.

The type of oscillation circuit to be hereinafter described is in general, similar to that disclosed in R. V. L. Hartley Patent No. 1,356,763, October 26, 1920. However, it comprises two space discharge devices connected in push-pull relation and a frequency determining circuit comprising a variable condenser in parallel with a multi-strand coil. The strands of the coil provide independent paths for direct current, but a single path of low reactance for alternating current.

The various leads are materially reduced in length and number, with a consequent reduction in the tendency of the circuit to produce spurious and undesired oscillations. A compact structure is provided, in which the oscillations generated are very stable as to frequency.

The invention will be more fully understood from the following description in connection with the attached drawing, the single figure of which illustrates one embodiment of the invention.

Two space discharge devices 35 and 36 each containing grid, filament and plate electrodes are arranged in push-pull relationship and together with condenser 37 and inductance 38 constitute an oscillation generator.

Condenser 37 may be the ordinary variable air type condenser, the capacitance value of which is so chosen that with the multi-strand coil 38 a frequency determining circuit is formed which may be adjusted to any frequency within the desired range.

Coil 38 consists of a metallic, preferably copper, tube 31 which encloses insulated conductors 32 and 34. The number of the enclosed conductors is not limited to two but may be as many as desired. In the present instance only two conductors are required.

Battery 39 supplies heating current to the filament of tubes 35 and 36 in parallel.

Battery 40 supplies space current to the discharge devices 35 and 36.

The space current path for the device 35 extends from the positive terminal of battery 40, conductors 34 and 34' to the plate of discharge device 35, across the space within this device to its filament and thence to the negative terminal of the battery. The space current circuit for the device 36 is similar to that traced above but includes conductors 34, 34'' and the space path of device 36.

The terminals of the copper tube 31 and the conductors 32 and 34 are connected together by condensers 27, 28, 27' and 28' which are of substantially negligible impedance for alternating current. The conductors 31, 32 and 34 cooperate to constitute a single inductance element and, because of the presence of condensers 27, 28, 27' and 28', the strands 31, 32 and 34

32 and 34 may be used as separate conductive paths for direct current.

The oscillations generated in the tuned circuit may be supplied through the conductors 47 and 48 and transformer 49 to a suitable load circuit.

In a practical construction the coil 38 is approximately 2" in diameter and 3" long. The base, upon which a standard socket for vacuum tubes is mounted, is approximately 2" x 2".

By placing a coil of the above dimensions between two of such bases arranged back to back, so that the vacuum tubes extend in opposite directions from the respective bases, the terminals on the bases may be connected to the terminals of and to taps on the coil. In this manner the length of the connecting leads is reduced to a minimum and a compact structure is provided. Moreover, the tendency of the system to produce undesired or parasitic oscillations is reduced to a minimum and the operation of the system, to generate oscillations of the frequency determined by the tuned circuit 37-38, is stabilized.

What is claimed is:

1. In a space discharge oscillator, a pair of three-electrode space discharge devices in push-pull relation, a resonant circuit connected to the electrodes of said devices for determining the frequency of the oscillations, said circuit including an inductance coil comprising a hollow tube conductor and a plurality of insulated conductors positioned within said tube, said conductors being adapted to function as a single inductance for alternating currents, but as a plurality of separate paths through which direct current may be supplied to said devices.

2. In a space discharge oscillator, a pair of three-electrode space discharge devices in push-pull relation, a resonant circuit for determining the frequency of the oscillations comprising an inductance and a variable condenser, said inductance comprising a plurality of insulated conductors enclosed in a conducting envelope, each conducting element providing a separate path for direct currents while said elements constitute a single inductance for alternating current.

3. An electric oscillator comprising an electric discharge device and a tuned circuit for determining the frequency of the oscillations including a capacity element and an inductance element, said inductance element comprising a plurality of insulated conducting elements and a conducting envelope element enclosing said insulated conducting elements, the conducting elements each providing a separate path for direct currents and together constituting a single inductive path for alternating currents.

4. An electric oscillator comprising an electric discharge device having an anode, a cathode and a control element, a tuned circuit

for determining the frequency of the oscillations and including a capacity element and an inductance element, said inductance element comprising a plurality of insulated conducting elements and a conducting envelope element enclosing said insulated conducting elements, all of said conducting elements constituting a single inductive path for alternating currents, means for supplying a direct current potential to said control element through one of said insulated conducting elements, and means for supplying space current between said anode and cathode through another of said insulated conducting elements.

5. In combination, an electric discharge device, a source of direct current therefor, an inductance device comprising an envelope conductor and another conductor mounted within said envelope conductor and insulated therefrom for direct currents, means for connecting said conductors in parallel for alternating currents, and means for supplying direct current from said source to said device through only one of said conductors.

6. In combination, two electric discharge devices each having a cathode, an anode and a control element, an inductance element comprising a conducting envelope and a plurality of insulated conductors enclosed in said conducting envelope, a circuit interconnecting the anode and cathode of one of said devices, said circuit including one of said insulating conductors and a source of direct current, a second circuit including another of said insulating conductors and interconnecting the control electrode and cathode of the other of said devices, and capacity means connecting said insulated conductors with said conducting envelope.

7. In combination, an electric discharge device having an anode and a cathode, an inductance element comprising an envelope conductor and another conductor mounted within said envelope conductor and insulated therefrom, means having a low impedance to alternating currents and substantially infinite impedance to direct currents for connecting together corresponding terminals of said envelope conductor and said other conductor, means for setting up a direct current flow through one of said conductors, and connections from said one conductor to said anode and cathode.

In witness whereof, I hereunto subscribe my name this 2nd day of April, 1928.

HARALD T. FRIIS.