March 31, 1936. W. R. BLAIR ET AL 2,035,456

RADIO FREQUENCY CHOKE COIL

Filed April 12, 1932

FIG. 1.

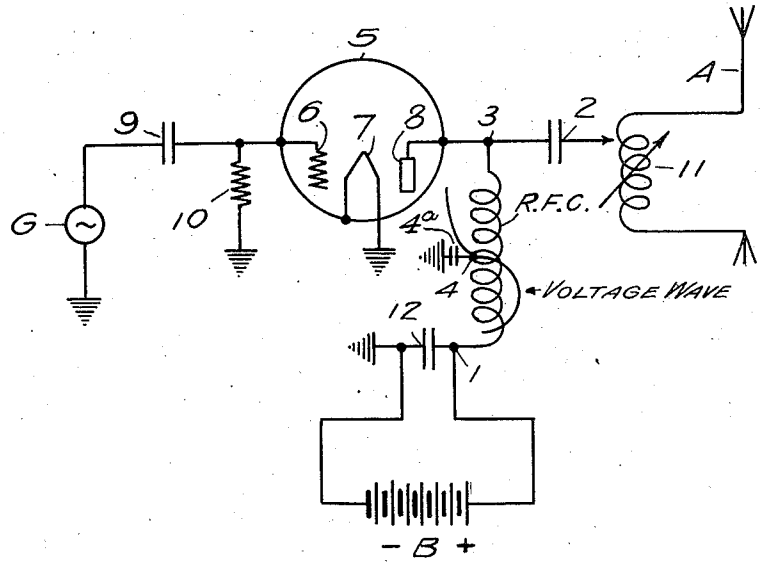
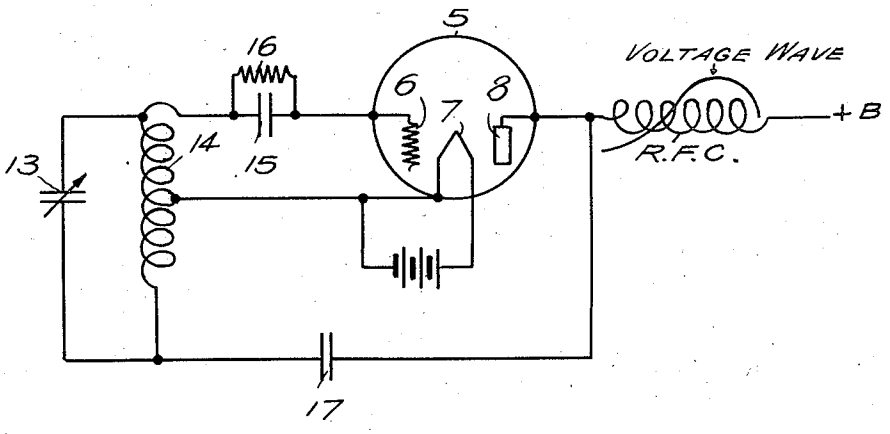


FIG. 2.



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Patented Mar. 31, 1936 2,035,456

UNITED STATES PATENT OFFICE

2,035,456

RADIO FREQUENCY CHOKE COIL

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Application April 12, 1932, Serial No. 604,770

4 Claims. (Cl. 250—36)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to us of any royalty thereon.

This invention relates to improvements in radio frequency choke coils and proposes an agency of this type which will be applicable more particularly to high frequency current generating systems.

Choke coils are employed whenever it is necessary to introduce direct current into a circuit at a point at radio frequency potential, the purpose being to prevent the impedance of the direct current source from imposing a load upon the radio frequency circuit. Such coils are commonly used between the power source and the plate or anode of an oscillator tube.

An object of the present invention is to produce a design of wave coil or radio frequency choke coil which will eliminate feedback of radio frequency energy into the direct current source in order to avoid danger of generator burnout; to minimize transformer breakdown, and to prevent undesired rectifier oscillation. Other objects will appear as the description proceeds.

In general practice where by-pass condensers have been used, the type of choke generally chosen for use therewith has been designed to have a high impedance in relation to said condensers. In general, opinions have differed as to whether the choke should possess inductive or capacitive reactance.

With the foregoing in mind, the design and theory of operation of the present improvements will be described more in detail in connection with the accompanying drawing in which:

Fig. 1 illustrates a separately excited oscillator circuit arrangement embodying the invention; and

Fig. 2 illustrates a self-excited oscillator circuit embodying the invention.

We have found that a choke coil in accordance with the present invention should be designed as follows: The inductance and distributed capacity should be resonant at such a frequency that an odd number of quarter wave lengths appears as a standing wave on the radio frequency choke.

Referring to Fig. 1, a source of alternating current energy is provided as at G for exciting vacuum tube 5, here shown as a three element tube having a grid 6, cathode or filament 7, and anode or plate 8. The energy from G is fed to the grid 6 of tube 5 through feed condenser 9 and a suitable grid resistor is indicated at 10. The plate output of the tube 5 is connected through a capacity coupling 2 to inductance 11 to feed the antenna system A. Interposed between the plate 8 and source of plate potential B is a wave coil or radio frequency choke coil R. F. C. designed in accordance with the present invention so that an odd number of quarter wave lengths appears as a standing wave on said choke. The numeral 12 designates a by-pass condenser in shunt with plate source B.

Referring to Fig. 2, which shows a partial circuit arrangement of the self-excited type, 13 denotes a tuning condenser for inductance 14 forming part of the grid circuit of tube 5, which includes the usual grid condenser 15, and grid leak or resistor 16, the condenser 17 being a plate blocking condenser. Interposed between the plate 8 and the positive side of the source of plate potential B is radio frequency choke coil R. F. C. designed to function in accordance with the present invention.

Thus, in accordance with the invention, the coil R. F. C. has a standing wave of three quarters wave length upon it and as the plate is tied in at a voltage anti-nodal point, no loss of radio frequency current results. The source of plate potential is tied in at nodal point 1 and is thus at zero radio frequency potential. Now if an antenna circuit is fed from coil R. F. C. by means of a capacity coupling as at 2, no even harmonics of the fundamental can be fed to the antenna system, as coil R. F. C. will have a node at 3 for the second harmonic. Furthermore, the nodal point 4 is grounded to filter off the odd harmonics. A capacity 4a is provided between point 4 and ground to prevent short-circuiting the current supply of plate source B.

Thus it will be noted that by capacity feeding the antenna from even harmonic nodal points on the wave coil, means is provided which avoids excitation of the antenna at harmonics of the fundamental. Moreover, by grounding the odd harmonic nodal points of the choke, the odd harmonic currents generated by the tube are effectively filtered from the output circuit.

We claim:—

1. In an oscillation circuit, comprising an electron tube having its electrodes operatively coupled thereto; a source of plate current; a radio frequency choke coil interposed between said source and the oscillation circuit having inductance and distributed capacity resonant at such frequency that an odd number of quarter wave lengths appears as a standing wave on said

coil; and means for grounding a point between said coil and said source for radio frequency.

2. In an oscillation circuit, comprising an electron tube having its input and output electrodes operatively coupled in said circuit; a current source for the output electrode of said tube; and means interposed between said current source and the output of said tube adapted to feed supply current without loss of radio frequency energy, said means comprising a wave coil having inductance and distributed capacity resonant at such frequency that an odd number of quarter wave lengths appears as a standing wave on said coil, said coil being connected to the output electrode of said tube at an anti-nodal point, and to the said current source at a nodal point thereof.

3. In a radio signalling system, comprising an electron tube circuit and a load circuit coupled thereto; a current power supply for the output electrode of said tube; and means interposed between said tube circuit and power supply to prevent loss of radio frequency energy through said power supply, said means comprising a wave coil having inductance and distributed capacity resonant at such frequency that an odd number of quarter wave lengths appears as a standing wave on said coil.

4. In a radio signaling system, comprising an electron tube circuit, a load circuit coupled thereto, and including a power supply for the output of the tube circuit; means to prevent harmonic excitation of said load circuit comprising a wave coil interposed between said tube circuit and power supply, said coil having inductance and distributed capacity resonant at such frequency that an odd number of quarter wave lengths appears as a standing wave on said coil, the tube circuit being connected to an anti-nodal point and the power supply to a nodal point of said coil; and means for grounding an intermediate point of said coil for radio frequency.

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