

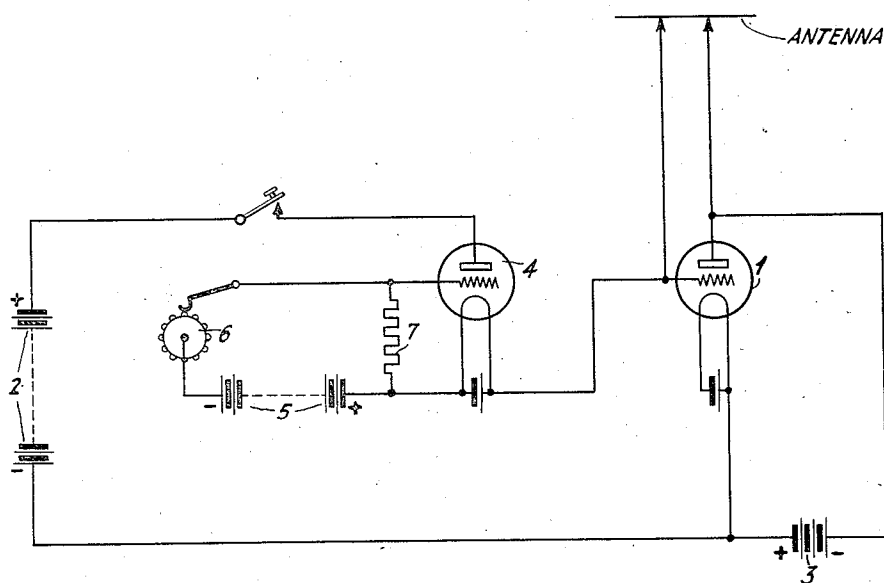
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METHOD OF GENERATING ULTRARADIO FREQUENCY SOUND MODULATED OSCILLATIONS

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METHOD OF GENERATING ULTRARADIO
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LATIONSWaldemar Ilberg, Berlin, Germany, assignor to
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3 Claims. (Cl. 250—36)

This invention is concerned with a method to sound or audio frequency modulate oscillations of ultrahigh frequency produced by the aid of the Barkhausen-Kurz circuit scheme known in the prior art.

In an arrangement of the Barkhausen-Kurz type there is impressed upon the grid of a triode tube a high positive potential and to the anode a low negative or positive potential in reference to the filament. When the construction elements and the circuit assembly are chosen properly, oscillations due to the erratic travel of electrons are obtained which vary in length between 10 and 100 cm., and these may be utilized for radio intelligence transmission. For this practical purpose, tonal modulation of the waves becomes generally necessary in order that direct auditive reception may be feasible, heterodyning being inadmissible because of the lack of stability or constancy of frequency of the oscillations thus generated, at the present state of the art. According to the earlier art, it is customary to impress an audio frequency alternating potential upon the plate voltage. The present invention has recourse to a different and more advantageous method.

The idea underlying this invention is predicated upon this fact that in the actual operation of a Barkhausen-Kurz transmitter, by the adoption of the highest possible working voltage for the purpose of increasing the power and of reducing the wave length depending upon the voltage in this circuit scheme, the thermal load placed upon the grid usually must be pushed to an extreme amount. To be sure, a further increase in the grid potential and the grid current would raise the power of the transmitter equipment and reduce the wave length; but this would occasion premature destruction of the tube.

According to the invention, a further increase in the potential is possible if the transmitter is cut in and rendered operative only for a short time interval followed by a currentless or dead period inside which the grid electrode carries no load and is thus able to cool off. During the actual operating times a comparatively shorter wave of higher energy is thus radiated off contrasted with what is true without the adoption of the said step or method. Now, the switching period of the transmitter may advantageously be chosen so high (say, 800 cycles) that the waxing and waning of the transmitter wave is rendered audible at the receiving end in the form of a modulating note or sound. In many instances the "on" and the "off" periods may be roughly

chosen equal, though it will be understood also that the interval relationships are useful or practicable. Since the starting and the stopping of the oscillations occurs inside a nearly immeasurably short time in view of the extremely high frequency of the transmitter, there results an almost ideal rectangular modulation curve which is superabundant in harmonics of a high order, with the result that very wide side bands result in the radio frequency oscillations. In contradistinction to the art of wireless telegraphy using long waves, this circumstance is very advantageous since it facilitates the location of the transmitter by the aid of extremely sensitive and therefore highly selective receivers.

In order to carry the basic idea of the invention into effect the grid potential and thus the grid current are keyed in and out at a rhythm equal to a tonal frequency. In the simplest possible manner this is accomplishable by a mechanically actuated switch being, for instance, of the type of a Wagner hammer break or a commutator provided with a sliding brush. However, it is then found that the contact points become rapidly corroded as a result of sparking. In addition, the desired rectangular modulation curve would be lost as a consequence of the opening arc. Hence, it is necessary either to use a vacuum switch of the type known in the prior art or else the interposition of a thermionic or electron tube controllable practically without any energy to speak of.

A scheme of this kind is illustrated in the attached drawing, where 1 is the generator tube working in a Barkhausen-Kurz circuit scheme, 2 the grid battery, 3 the plate battery, 4 the electron tube connected in series and serving for producing the control action, 5 a biasing battery, 6 the make and break device operating at tonal frequency, and 7 a high-ohm resistance. It will be seen that the grid of the control tube is at cathode potential when device 6 is opened, with incidental emission in the control tube, whereas the latter is blocked when device 6 is closed, with the result that the waves issuing from the transmitter cease. It is advisable to choose a control tube possessing a high gain-reciprocal ($1:\mu$) which will insure adequate electron emission even when the grid potential is at zero.

I claim:

1. The combination with an electron discharge device oscillator having an anode, cathode, and control electrode and means for maintaining said control electrode at a high positive potential relative to said cathode and anode for the generation

of oscillations, of another electron discharge device connected in series with the control electrode of said first device, and a keyer in circuit with said other device for automatically interrupting the passage of current in said second device periodically at an audio frequency rate, whereby the oscillations generated by said first device are also interrupted.

2. In combination, an electron discharge device oscillator having anode, cathode, and control electrodes, means for maintaining said control electrode at a high positive potential with respect to said anode and cathode for the generation of oscillations, a space path connected in series with the high potential control electrode of said device comprising a second electron discharge device also having anode, cathode and control electrodes, said last anode being connected to said means, and said last cathode being connected to the grid of said first device, and a circuit interrupter connected to said control electrode of said second device for periodically interrupting the passage of current therethrough

at an audio frequency rate, whereby the oscillations generated by said first device are simultaneously interrupted.

3. In combination, a first electron discharge device oscillator having anode, cathode, and a grid, means for maintaining said grid at a relatively high positive potential and means for maintaining said anode at a much lower potential with respect to said cathode, said first means including in series therewith a space path comprising a second electron discharge device having an anode, cathode and grid, a high resistance connected between said grid and cathode of said last device, and a connection in shunt to said resistance, said connection comprising a periodic circuit interrupter operating at an audio frequency rate arranged in series with a source of negative potential for said last grid whereby said second device is rendered inoperative and the oscillations generated by said device interrupted when said interrupter is closed.

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