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OSCILLATION GENERATOR

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Fig. 1.

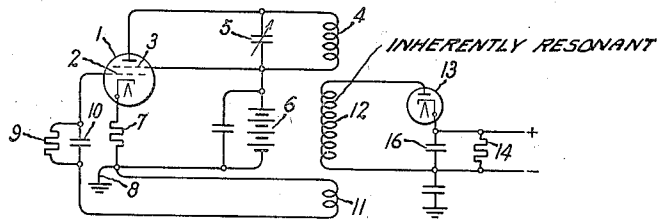
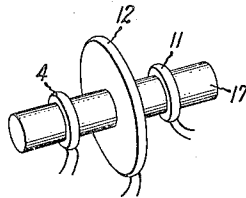


Fig. 2.



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UNITED STATES PATENT OFFICE

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OSCILLATION GENERATOR

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1 Claim. (Cl. 250—36)

My invention relates to oscillation generators and more particularly to such generators adapted for the generation of high voltages. Such generators find application, for example, in the production of oscillations, which when rectified may be utilized to supply operating potential to the high potential electrodes of cathode ray apparatus.

One of the objects of my invention is to improve the stability of such oscillation generators with respect to variation in frequency.

Another object of my invention is to provide such an oscillation generator the operation of which is free from the so-called "drag loop effect." That is it sometimes happens that if the frequency of an oscillator be varied by variation of a tuning control member in one direction, for example, the oscillations build up until a certain point is reached when they suddenly collapse, or reduce abruptly in intensity to a very low value. If the tuning control member then be moved beyond the position where this phenomenon occurs and then be reversed, the oscillations again build up to a very high intensity at a position of the tuning control different from that at which the previous high value occurred, and then again suddenly reduce to a low intensity. This effect may be produced by reason of coupling between different circuits having different resonance periods which are associated with the oscillator. For example, such coupling may exist between the frequency determining circuit of the oscillator and a load circuit having a resonance period such that it affects the operation of the oscillator and frequency produced thereby.

An object of my invention is to provide coupling between the oscillator circuits and that of the load such that these undesired effects are avoided.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claim. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the accompanying drawing in which Fig. 1 represents an embodiment of my invention and Fig. 2 represents a structural detail thereof.

Referring to Fig. 1 of the drawing, I have shown therein an electron discharge oscillation generator employing an electron discharge device 1, having an anode, a cathode and two grids interposed therebetween, namely the usual control

grid 2 and a screen grid 3. The anode circuit of the oscillator comprises a tunable circuit having inductance 4 and capacitance 5 connected in parallel, a source of operating potential 6 and a resistor 7, the terminal remote from the cathode of which is grounded as at 8. The grid circuit of the oscillator comprises the usual grid leak and condenser combination 9, 10 and a grid coupling coil 11, the low potential terminal of which is connected to ground as at 8. A frequency determining load coil 12 is coupled to the coils 4 and 11 and is utilized to supply oscillations to a rectifier 13, whereby they are rectified and produce a unidirectional potential upon a load resistance 14. The frequency of oscillations produced is determined by the inductance of coil 12 and shunt capacitance comprising the distributed coil capacity and the capacity of the associated rectifier circuit including in particular the inter-electrode capacity of rectifier device 13, as well as the stray capacity of connecting leads. The load resistance 14 is shunted by a condenser 16 of shunt capacity to smooth out any ripple component of voltage across the resistance 14 thereby to produce a smooth unidirectional potential.

Fig. 2 represents the physical arrangement of the coils 4, 12, and 11. It will be seen that these coils are wound upon a suitable non-conducting form 17, the coil 4 being positioned near one end thereof, the coil 11 near the opposite end thereof, and the coil 12 being a larger pancake type of coil positioned intermediate the coils 4 and 11. The spacing between the coils 4 and 11 is preferably so great that the direct coupling therebetween is insufficient to support oscillations in the discharge device, that is, if coil 12 be removed, the coupling between coils 4 and 11 is insufficient to support oscillations and the device is inoperative. Coil 12, however, being coupled to both coils 4 and 11 has oscillations excited therein from the coil 4 and induces oscillations into the coil 11 thereby producing coupling between the anode circuit and the grid circuit of the oscillator such that oscillations are produced.

It has been found that with the structure as thus arranged, because of the high reactance of the resonant load circuit, oscillations of extreme intensity may be produced such that a voltage on resistance 14 of four or five thousand volts may be obtained, such voltage being sufficient for use as operating potential upon the high voltage electrodes of cathode ray apparatus, such as the picture reproducing devices used in television receivers. Thus the device is very useful in television receivers in which the source of op-

erating potential 6 may be only of the order of one hundred and ten volts.

The drag loop effect previously described is wholly absent from the operation of the device as described. If condenser 5 be adjusted from one limit of its range of adjustment to the other, the intensity of oscillations gradually increases until a peak is reached and thereafter the intensity of the oscillations gradually reduces. If the adjustment be then effected in the reverse direction, this same operation occurs, the relation between intensity of the oscillations and the position of the tuning control being the same for both directions of movement of the tuning control member and being entirely predeterminable. The operation of the oscillator is stable at any adjustment of the condenser 5. With this arrangement condenser 5 serves simply to tune out the reactance of coil 4 and the leakage reactance between coils 4 and 12 so that the discharge device 1 operates into a reasonably high impedance at the resonant frequency of the circuit of coil 12 thereby to obtain maximum efficiency of vacuum tube operation. It is found that the tuning effect in so far as frequency control is concerned is negligible with wide variations in the value of condenser 5.

Preferably the discharge device 1 is of the screen grid type, thereby to avoid any coupling between the anode circuit and the grid circuit of the discharge device, other than such coupling as exists through the coil 12. Of course, if desired, suitable neutralizing arrangements may be employed to neutralize such coupling as may exist between the anode circuit and the grid circuit of the device as by reason of interelectrode capacity. By confining the coupling required to support oscillations to the path through the load coil 12 which, of course, usually has its natural period within the range of tuning of the circuit 4-5 at which maximum intensity of oscillations

is produced, the desired results previously described are secured, and the oscillation takes place substantially at the natural frequency of coil 12.

Resistance 7 is employed to produce a suitable bias upon the grid sufficient to protect the discharge device against excessive anode current if oscillations cease for some reason. Normal operating bias is produced by the usual grid leak and condenser combination 9, 10.

While I have shown a particular embodiment of my invention, it will, of course, be understood that I do not wish to be limited thereto since different modifications both in the circuit arrangement and in the instrumentalities employed, may be made and I contemplate by the appended claim to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

A system for producing high unidirectional voltage for operation of cathode ray apparatus and the like, comprising an electron discharge oscillation generator having an anode, a cathode, a control electrode, a source of operating potential for said anode, an inductance coil connected between said anode and cathode, an inductance coil connected between said control electrode and cathode, said coils being so positioned that direct coupling therebetween is insufficient to support oscillations, an additional coil of high reactance tuned to the frequency of oscillations to be produced coupled to both of said first two coils and proportioned relative thereto to have oscillations produced therein having intensity many times greater than the potential of said source and to induce oscillations in said second coil to maintain said oscillations, and a rectifier to rectify said oscillations and to supply the rectified potential to said apparatus.

ROBERT B. DOME.