May 29, 1934. H. SCHUMACHER 1,960,419

INDUCTIVELY BACK COUPLED TUBE GENERATOR

Filed Dec. 11, 1930

*Fig. 1*

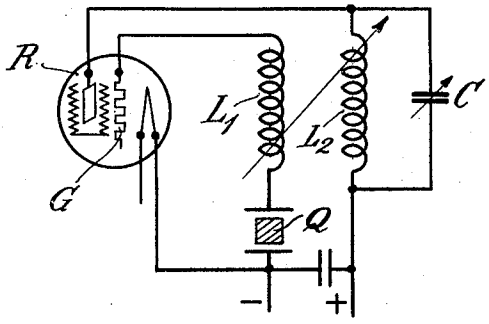
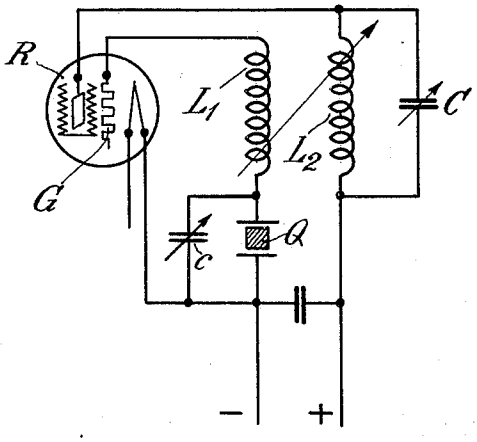



*Fig. 2*




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## INDUCTIVELY BACK-COUPLED TUBE GENERATOR

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1 Claim. (Cl. 250—36)

The present invention relates to an inductively back-coupled vacum tube oscillation generator, the fundamental principle of which is generally known. A difficulty often found in generators of this type consists in that they are not able to maintain the frequency produced sufficiently and exactly constant for all purposes. As long as one single transmitting apparatus operates on one wave, as is commonly done in wireless telegraphy, it is not so important that the constancy of the frequency as such be maintained as is the case when broadcasting with equal or carrier waves. If it is desired to use tube generators for the latter purpose, arrangements must be provided, which will maintain the frequency sufficiently constant. It has been ascertained by tests that it is necessary in the first place to stop the grid current. According to this invention no use is made of a condenser, as should be expected on first thought, for that purpose, but merely, of a crystal of quartz. For the transmitting tube, preferably a tube with a screen grid is employed, the screen grid of which, however, has been left on an open circuit.

A preferred embodiment of the arrangement according to the invention is illustrated diagrammatically in the drawing by way of example.

Figure 1 represents diagrammatically a vacuum tube oscillation generator of known design, being inductively back-coupled, and adapted for use according to this invention, and

Figure 2 shows diagrammatically a similar view. The blocking or stopping means is applied according to this invention in conjunction with a variable condenser *c* shunting the crystal Q.

Referring to the tube generator represented in the drawing, the grid G of the tube R is back-coupled by way of the coil $L_1$ with the tuned coil $L_2$. A condenser C is associated with the coil $L_2$ for tuning purposes. The anode potential is supplied in known manner between the + and — terminals. Normally Q is not inserted, $L_1$ being connected between the grid and the — terminal. In the arrangement shown in the drawing there is a quartz crystal Q interposed, according to the invention, in the grid circuit for the purpose of stopping or blocking the continuous current of the grid. In special cases, the arrangement may be rendered more complete if a condenser *c* is connected in parallel with the piece of quartz Q, as shown in Fig. 2. These arrangements of elements offer the advantage over the customary devices, in that the tube may be energized by generators and not, as was the case up to the present, by batteries only. In addition, the minute supervision which was formerly required, of the voltages of the batteries by means of precision instruments is rendered unnecessary. With the modified apparatus it is merely necessary to protect the piece of quartz against changes of temperature by means of thermostats of known construction. As this can be accomplished very easily, it is obvious that the arrangement according to the invention will offer considerable advantages.

This is usually done if the susceptance of the piece of quartz is too small to cause any generation of oscillations.

What is claimed is:

An oscillation generator comprising a vacuum tube having a cathode, a control grid, an anode and a floating screen grid interposed between the control grid and the anode, a circuit connected between said cathode and said anode, an inductance shunted by a tuning condenser included in said circuit, a circuit connected between said control grid and said cathode, an inductance in said grid cathode circuit coupled to the anode circuit inductance, and a frequency determining quartz crystal connected in said grid cathode circuit in series with said inductance thereof so as to block direct current from said control grid.

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