Feb. 4, 1930. E. SCHRACK ET AL 1,745,559

ELECTRON DISCHARGE TUBE GENERATOR

Filed Dec. 1, 1924

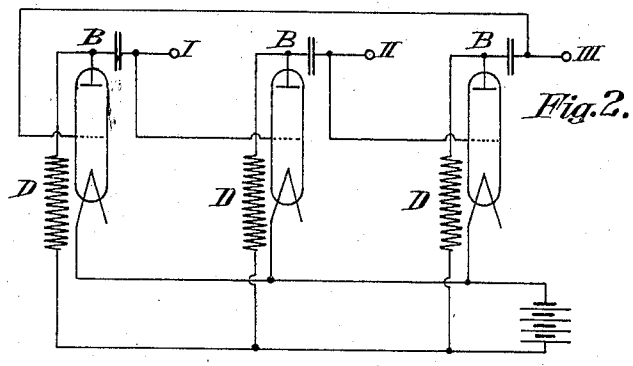
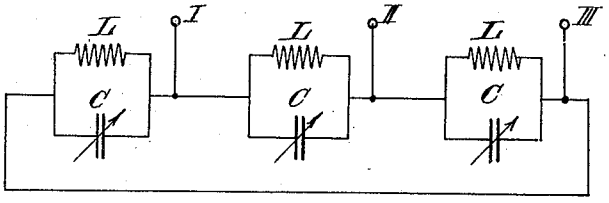


Fig. 2.

Fig. 1.



Inventors
Eduard Schrack and
Robert Ettenreich
By B. Singer, Atty.

Patented Feb. 4, 1930

1,745,559

UNITED STATES PATENT OFFICE

EDUARD SCHRACK AND ROBERT ETTENREICH, OF VIENNA, AUSTRIA

ELECTRON-DISCHARGE-TUBE GENERATOR

Application filed December 1, 1924. Serial No. 753,255.

The principle upon which the present invention is based is that voltages of the devices controlling the discharge spaces of electron discharge tubes are tapped off at proper phase from a connection, in which the anode or plate currents in turn maintain the polyphase oscillation. This is similar to the manner in which the valve-motion on the shaft of an internal combustion motor causes the cylinders to work in correct cycle. In a motor having a single cylinder the energy delivery takes place intermittently once at each revolution, and there are analogous relations and conditions in connection with an oscillation circuit connection having only a single discharge tube or electron discharge space.

In the accompanying drawings

Figure 1 is a diagram showing the oscillating circuits.

Figure 2 is a similar view of our improved high frequency generator.

In accordance with our invention and as shown in Figure 2, a three tube connection is employed, each tube being provided with an anode, a cathode and a grid. The anode of each tube is connected through a resistance D to the source of anode voltage and also through a direct current checking means to the grid of the next tube. That is to say, the anode of the third tube is connected on the one hand over a coupling reactance D to the anode voltage source and on the other hand over a coupling condenser B to the grid of the following, that is to say, to that of the first tube. The grid of the said third tube is connected through the condenser to the anode or plate of the preceding tube. Three points or terminals I, II, III are indicated. Arithmetically and by means of experiments it can be proved readily that between any two of these points a negative resistance exists and that an oscillation circuit of sufficient low loss being connected between any two of these three terminals is caused as well to oscillate.

When three oscillation circuits are arranged according to the mesh (delta) or polygonal connection all of said three circuits oscillate, but in such manner that the sum of the voltages which are associated to them is zero, since the sum of the voltages in a closed loop is always equal to zero.

If the three circuits are equal, they will oscillate at the same frequency and owing to the symmetrical arrangement also with the same amplitude. But the sum of three alternating voltages of equal amplitude and frequency can only be zero in every moment, if the individual voltages are displaced in phase to each other by an angle being equal to $\frac{2\pi}{3}$. This has been proved to be correct by experiments.

We claim:

A high frequency generator comprising three discharge tubes each provided with an anode, cathode and grid, an anode voltage source, the anode of each tube being connected through a resistance to the source of anode voltage and also through a direct current checking means to the grid of the next tube, the anode of the last tube being similarly connected to the grid of the first tube, and oscillating circuits connected in polygonal arrangement, the corners of which are connected to the grids, so that such oscillating circuits are insulated from the source of anode voltage and govern themselves mutually with phase displacement equal to 120°.

EDUARD SCHRACK.

DR. ROBERT ETTENREICH.