

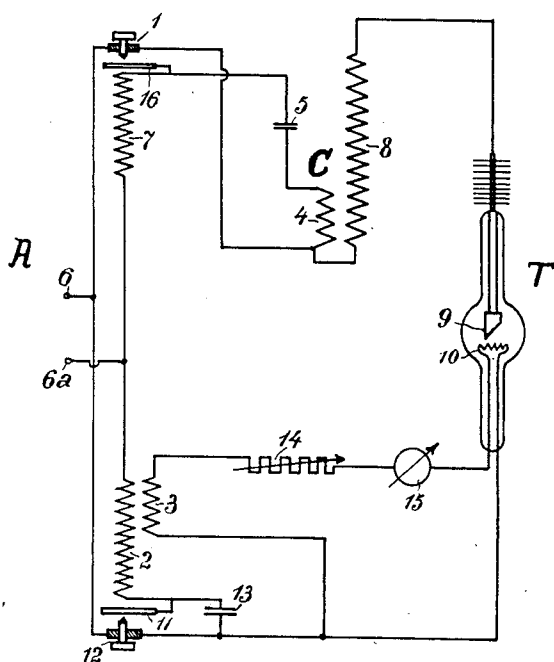
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HIGH FREQUENCY CIRCUITS

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## UNITED STATES PATENT OFFICE.

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## HIGH-FREQUENCY CIRCUITS.

Original application filed August 11, 1925, Serial No. 49,506, and in Germany August 11, 1924. Divided  
and this application filed September 17, 1927. Serial No. 220,232.

The present application is a division of my prior application filed August 11, 1925, Serial No. 49,506.

This invention relates to high frequency circuits for therapeutic purposes of that type employing a Roentgen tube and a Tesla coil, and particularly to a circuit organization embodying novel means for heating the glow cathode of the Roentgen tube.

The object of the invention is to provide means for dispensing with the use of a storage battery and for enabling current from either an A. C. or a D. C. line to be used to heat the glow cathode, without interference in the system in the use of the chopped up D. C. for the heating action.

The drawing shows a diagram of a high frequency circuit embodying my invention.

Operation of glow cathode Roentgen tubes with high frequency apparatus (Tesla arrangement) is known. The current required for heating the glow cathode is taken either from a storage battery or, if A. C. from a supply line, through a special transformer.

In order to provide, in the use of direct current from a supply line, the chopped up direct current necessary for operating the Tesla device, generally an electro-magnetic interrupter is used. Theoretically this current might also be used for feeding the heating transformers for the supply of current in proper continuity to the cathode of the tube. But this is inexpedient, since the current owing to its double function (interruption of direct current and simultaneous spark gap action of the impulse circuit of the Tesla device), is not properly interrupted by the interrupter, that is to say, can not be supplied with the necessary continuity or smoothness.

According to the present invention, I use two independent interrupters, one serving for operating the Tesla device, and the other controlling the transformation of the D. C. for heating the glow cathode of the Roentgen tube in such manner that a properly modified current for the heating action is supplied.

In the drawing, A is an oscillation cir-

cuit of the character described containing a Roentgen tube T and a Tesla transformer C.

The operating current is tapped at the connecting point 6, 6<sup>a</sup>.

The current is led on the one hand to an electromagnetic interrupter for operating the Tesla device, and on the other hand to a second electromagnetic interrupter for feeding the heating current circuit.

The interrupter for the Tesla device comprises an exciter coil 7, armature 16 and contact 1. In parallel with the interrupter is arranged the impulse circuit proper comprising the condenser 5 and primary coil 4. The primary coil 4 excites the ray coil 8 to produce strong high frequency oscillations which are then led to the anode 9 of the Roentgen tube. This interrupter functions as a spark extinguisher and oscillation discharge-control device.

The second and separate interrupter is intended for feeding the heating circuit, as by the use of a transformer which supplies the low tension heating current for the glow cathode 10. This arrangement comprises the primary 2 of the heating transformer as an exciter coil, armature 11 influenced thereby, and contact 12, and the spark extinguishing condenser 13. The primary 2 is coupled at one end to one side of the line and at its other end to the armature 11 and the condenser 13, which are in series with such primary and between the same and the other side of the line. For regulating the heating current for the cathode 10, there is provided between the secondary 3 of the heating coil and the cathode a variable resistance 14. 15 is a meter for reading the current strength.

The interrupter 2, 11, 12 furnishing the chopped up D. C. for the transformer, is caused to operate absolutely without sparking owing to its independence of action with regard to interrupter 1, 7, 16, and by the use of a capacity 13 of suitable value, the contact sequence being absolutely even so that modification of the current at the required constancy for the heating of the cathode is ensured. The circuit as above constructed allows of the use of heating current

for the cathode from either an A. C. or a D. C. line, so that no storage battery is required.

What I claim is:—

5 1. A supply circuit comprising a thermionic Roentgen tube, a Tesla transformer for the tube, an interrupter governing said transformer for controlling the circuit to produce oscillation discharges, a heating transformer,  
10 and means for controlling said heating transformer for supplying alternating current of reduced voltage to heat the cathode of the tube comprising a second interrupter operating to chop up the current delivered by  
15 the heating transformer at a constancy suitable for a cathode heating action.

2. A supply circuit comprising a supply line a thermionic Roentgen tube, a Tesla transformer for the tube, an interrupter  
20 governing said transformer for controlling the circuit to produce oscillation discharges, a heating transformer having its primary interposed in one side of the line, means

for controlling said heating transformer for supplying alternating current of reduced 25 voltage to heat the cathode of the tube comprising a second interrupter having its armature in series with the primary of said heating transformer, and a capacity between said primary of the heating transformer and the other side of the line, said second inter- 30 rupter operating to chop up the current delivered by the heating transformer at a constancy suitable for a cathode heating action.

3. A supply circuit comprising a thermionic Roentgen tube, a Tesla transformer for the tube, an interrupter governing said transformer for controlling the circuit to produce oscillation discharges, a heating transformer, 35 and means for chopping up the current supplied through said heating transformer so as to supply the current at a fixed constancy to the cathode of the tube. 40

In testimony whereof I affix my signature.

DR. GERHARD FREIHERR DU PREL.