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LAMP CIRCUIT

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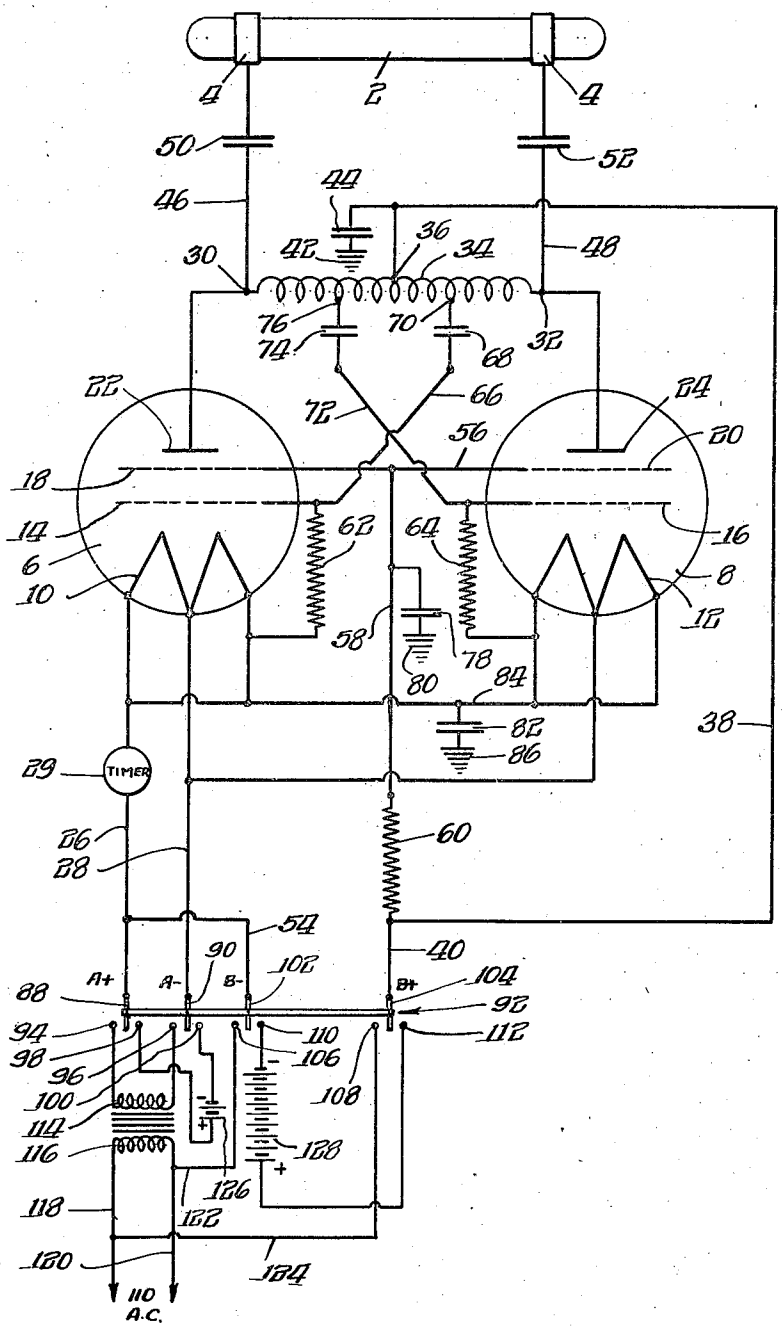

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LAMP CIRCUIT

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This invention relates to a circuit for energizing a gaseous discharge lamp by high frequency currents, and more particularly for energizing an ultra-violet, gaseous discharge lamp of the electrodeless type.

It is an object of this invention to provide a high frequency, energizing circuit for a portable ultra-violet lamp so that the same may be selectively connected to a source of alternating current or a battery, of relatively low voltage.

It is a further object of the invention to provide a high frequency, oscillating circuit capable of energization selectively from a relative low voltage, alternating current power supply or battery and yet supply a sufficient amount of high frequency power to energize an electrodeless, ultra-violet lamp for therapeutic or other analogous uses.

Other and further objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying schematic drawing of a circuit constructed in accordance with the invention.

As shown in the drawing, the lamp 2 may be a quartz, ultra-violet ray lamp, filled with mercury vapor, argon, neon, helium, and krypton or other suitable rare gases, and with a globule of mercury, after which the lamp is sealed off.

High frequency current for the excitation of the lamp is supplied thereto by external clips or terminals 4, which also form means mounting the lamp in its reflector.

The oscillating circuit, of which the lamp 2 is a part, comprises thermionic tubes 6 and 8 having cathodes 10 and 12, control grids 14 and 16, screen grids 18 and 20, and anodes or plates 22 and 24. Each of the cathodes 10 and 12 comprises dual filaments capable of energization from a low voltage, heater source to supply a large emission. Thus all four filaments are connected in parallel to the supply leads 26 and 28 from a low voltage source of one and one-half voltage rating. An adjustable timer 29 is connected in the lead 26 to deenergize the tubes and the lamp after a predetermined, adjusted period of treatment. The plates 22 and 24 are connected to the opposite ends 30 and 32 of an oscillator coil 34 having a center tap 36 connected by wire 38 to the positive plate supply lead 40. The center tap 36, the wire 38, and also the positive supply lead 40 are grounded to the metal frame of the lamp as at 42 through a condenser 44.

The opposite ends 30 and 32 of the oscillator coil 34 are connected by wires 46 and 48, respectively, in which are interposed condensers 50 and

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52, to the terminals 4 of the gaseous discharge tube or lamp 2.

The negative power supply lead 54 is connected to the lead 26 from the positive side of the heater supply source. The power supply leads 40 and 54 are connected to a source having a voltage rating of the order of ninety to one hundred and ten volts.

The screen grids 18 and 20 are tied together by a wire 56 connected to the positive power supply lead 40 by a wire 58, in which is interposed a resistor 60. The control grids 14 and 16 are connected to the cathodes through grid resistors 62 and 64, respectively, the resistors being preferably connected to the positive sides of the filaments of the respective tubes. The control grids are also coupled to the oscillator coil 34, the grid 14 being connected by a wire 66 to a condenser 68, in turn connected to an intermediate tap 70 of the oscillator coil at a point between the central tap 36 and the end 32 of the coil, while the control grid 16 is connected by a wire 72 to a condenser 74, in turn connected to an intermediate tap 76 of the oscillator coil at a point between the center tap 36 and the end 30.

A condenser 78 is connected on one side to the screen grid lead 58 and grounded at its other side to the frame of the lamp as at 80. A condenser 82 is connected on one side to a wire 84 which joins the filaments of the tube 8 to the filaments of the tube 6, and on its other side is grounded to the frame as at 86. It will be evident that through the condenser 82 the positive side of the heater source and the negative side of the plate supply source is grounded to the frame of the lamp.

The lamp 2 forms a part of the tuned circuit, of which the oscillator coil 34 also forms a part, and it will be evident that a resonance current flows through the lamp to energize the same. The lamp is isolated from the direct current component of the plate voltage by means of the condensers 50 and 52. The circuit is maintained in balance in respect to the high frequency oscillating current, and parasitic oscillations which would cause flickering of the tube are suppressed, by the connections of the condensers 44, 78, and 82, as shown in the drawing. These condensers, as well as the condensers 50 and 52, serve to render the lamp unit shockproof.

The supply leads 26 and 28 are connected to blades 88 and 90 of a manual selector switch 92 by which they are connected selectively to contacts 94 and 96 or contacts 98 and 100. Similarly, the leads 54 and 40 are connected to blades

102 and 104 of the switch 92 by which they are connected selectively to contacts 106 and 108 or contacts 110 and 112.

The contacts 94 and 96 are connected to the opposite ends of a low voltage (1.5 volts) secondary 114 of a heater transformer having its primary 116 connected to the wires 118 and 120 of a power supply cord. The contacts 98 and 100 are connected to the positive and negative sides, respectively, of a battery 126 of 1.5 volts which may be housed in the lamp carrying case (not shown). The contacts 106 and 108 are connected by wires 122 and 124 to the wires 118 and 120 of the supply cord while the contacts 110 and 112 are connected to the negative and positive sides, respectively, of a 90 volt battery 128.

It will be evident that upon operation of the switch 92 to its left position, the filaments will be connected across the secondary 114 while the plate and return leads 40 and 54 will be directly connected through the supply cord to the 110 volt alternating current power supply. Upon movement of the switch 92 to its right position, the filaments will be connected across the 1.5 volt battery while the plate and supply leads are connected across the 90 volt battery.

The switch 92 may have a third, or mid-position, as shown, in which the power leads are disconnected from all sources.

In a preferred construction the tubes 6 and 8 are 3Q5GT tubes and the circuit constants have the following values:

(1) The resistors 62 and 64—10,000 ohms;

(2) The resistor 60—2,000 ohms;

(3) The condensers 44, 50, 52, 58, 74, 78 and 82—250 micromicrofarads;

(4) The oscillator or induction coil 34 consists of 16 turns of No. 18 cotton-covered wire on a cylindrical form 1⅜ inches in diameter, and has a winding length of one inch. The taps 70 and 76 are brought out 2¼ turns on each side of the center tap 36.

It is obvious that various changes may be made in the specific embodiment of the invention set forth for the purposes of illustration without departing from the spirit of the invention. Accordingly the invention is not to be limited to the specific embodiment shown and described but only as indicated in the following claims.

What we claim is as follows:

1. A circuit for energizing an ultra-violet gaseous discharge lamp comprising a thermionic tube oscillator circuit including an induction coil, and a circuit including the gaseous discharge lamp connected across the induction coil and forming with said coil a tuned tank circuit determining the frequency of operation of the oscillator.

2. A circuit for energizing an ultra-violet gaseous discharge lamp, comprising a pair of thermionic tubes having plate, cathode, and grid electrodes, an induction coil having a center tap, a source of electric current connected to said center tap, connections from said coil on opposite sides of said center tap to the plates of said tubes, the cathodes of said tubes being connected to said source, connections from said coil on opposite sides of the center tap to the control grids of said tubes to apply thereto potentials in proper phase to produce oscillating plate current, and a circuit connecting the gaseous discharge lamp to said

induction coil on opposite sides of said center tap and providing shunt tuning capacitance for said coil to determine the frequency of said oscillating current.

3. A circuit for energizing an ultra-violet, gaseous discharge lamp comprising a push-pull oscillator having a tuned tank circuit including an oscillator coil, and said lamp connected in shunt to said coil and providing shunt tuning capacitance for said coil to determine the frequency of operation of said oscillator.

4. A circuit for energizing an ultra-violet, gaseous discharge lamp comprising a push-pull oscillator having a tuned tank circuit including an oscillator coil having a center tap connected to a source of electric energy and grounded through a capacity and said lamp, said lamp being connected in shunt to said coil and providing shunt tuning capacitance for said coil to determine the frequency of operation of said oscillator.

5. A circuit for energizing an ultraviolet, gaseous discharge lamp comprising a push-pull oscillator having a pair of thermionic tubes, a tank circuit connected to the plates of said tubes and including an oscillator coil to the ends of which the lamp is connected for tuning the coil to determine the frequency of operation of the oscillator, said coil having a center tap forming a positive power supply lead for the plates of said tubes, said tubes having filaments, filament supply leads connected to said filaments, a negative plate-power supply lead connected to one of said filament leads, and condensers connected on one side to points of equal potential and connected on the other sides to said positive and to said negative supply leads.

6. A self-excited oscillator circuit for energizing an ultra-violet gaseous discharge lamp, comprising a tank circuit determining the frequency of operation of the oscillator and a pair of thermionic tubes connected in push-pull to said tank circuit, said tank circuit including an induction coil in the plate circuits of said tubes, and a circuit in shunt to said coil for tuning the tank circuit and including a pair of coupling condensers in series with said gaseous discharge lamp.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,300,916	Furedy	Nov. 3, 1942
2,121,829	Seaman et al.	June 28, 1938
1,639,805	McCullough	Aug. 23, 1927
2,327,346	Furedy	Aug. 24, 1943
2,132,654	Smith	Oct. 11, 1938

FOREIGN PATENTS

Number	Country	Date
357,492	Great Britain	Mar. 20, 1930

OTHER REFERENCES

F. E. Terman, Radio Engineering, 2d ed., 1937, McGraw-Hill, N. Y. C., page 370. (Copy in Library of Congress.)