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INDUCTION EXCITATION OF ELECTRIC DISCHARGE TUBES

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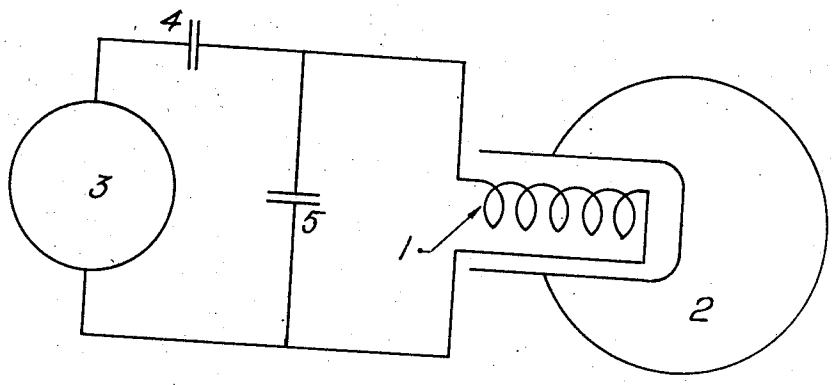

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INDUCTION EXCITATION OF ELECTRIC DISCHARGE TUBES

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1 Claim. (Cl. 176—124)

The present invention relates to a method of feeding tubes for electrical discharge in gases by means of a source of periodic current of high frequency, for example, by means of a high frequency alternator. This source of current has a constant voltage during the whole period of starting and of operation of the tube and is brought into communication with the ends of an inductance coil inductively coupled with the gaseous medium of the tube for the purpose of producing and maintaining in this gaseous medium a discharge with spark spectrum. The present invention and the claim include the case in which, in such an installation, the prolonged passage through the coil of a current corresponding to starting current for this discharge would produce excessive heating of the coil, and it includes a means for avoiding this heating.

The case considered occurs especially when the frequency of the supply current does not exceed that which may be produced industrially by a high frequency alternator, say about 30,000 cycles per second. The considerable electric field to be induced in the gaseous medium for the obtaining of the said discharge is then attained by bringing the current through the coil to an extremely high value which, after the starting of the tube, remains so important as to give rise to said excessive heating.

According to the invention, the above-mentioned means consists in tuning the circuit of the induction coil to resonance on the alternating current supply frequency to provide sufficient potential on said coil to start a discharge in the gaseous medium yielding a spark spectrum, the resonant circuit having a damping character such that the frequency shift, due to the changing impedance of this circuit, operates to limit the current to a value between that at which the spark spectrum type of discharge would be inhibited and that at which the heating of the coil would terminate the discharge.

In the accompanying drawing is shown, by way of example only, a single figure of a diagram in accordance with the present invention.

The induction winding 1 of the tube 2, which winding may comprise a finely divided ferromagnetic core (not shown), is supplied by the high frequency alternator 3. A condenser 4 is connected in series with the winding 1 and used for the tuning to resonance of the coil circuit, while another condenser 5 is connected across the terminal of the winding 1.

The current furnished by the potential source is such that it would correspond to the operation of the tube under arc spectrum conditions—the damping produced by the gaseous medium then being small—had the coil circuit not been brought to the frequency of the alternator.

Due to this tuning, the induction coil is traversed by an intense current and the difference of potential between consecutive turns of it attains a considerable value to which there corresponds an electrostatic field sufficient to produce a high ionization of the gaseous medium. Therefore, the conductivity of the said medium is highly increased in such a manner that, by means of a suitable selection of the various constants, the spark spectrum working conditions are fulfilled and the starting takes place. As soon as the starting its effected, the high reaction of the ionized medium on the induction winding reduces the current to the permissible value which can be supported without danger to this winding. Everything takes place then, as regards the discharge device 1, 2, as if it were a transformer, the secondary load circuit of which constituted here by the gaseous medium, had been closed suddenly.

The invention covers numerous variations without departure from its scope, as expressed in the appended claim. Thus, the condenser 5 may be dispensed with, the condenser 4 alone being connected in series with the winding 1.

I claim:

In combination, a gaseous discharge device having a gaseous medium therein, a coil so inductively coupled to the gaseous medium in said discharge device that a spark spectrum may be produced in said medium by energizing said coil, means for supplying alternating current to said coil comprising tuning means adapted to constitute with the coil a circuit resonant to the alternating current supply frequency to provide sufficient potential on said coil to start a discharge in the gaseous medium yielding a spark spectrum, the resonant circuit having a damping character such that the frequency shift, due to the changing impedance of this circuit, operates to limit the current to a value between that at which the spark spectrum type of discharge would be inhibited and that at which the heating of the coil would terminate the discharge.

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