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HOT ELECTRODES FOR ELECTRIC DISCHARGE TUBES

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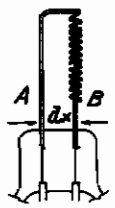

Fig. 1.

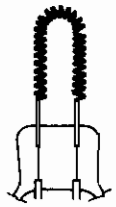

Fig. 2.

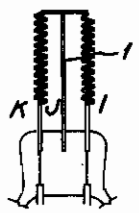

Fig. 3.

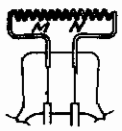

Fig. 4.

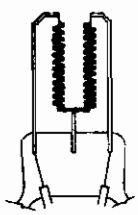

Fig. 5.

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HOT ELECTRODES FOR ELECTRIC DISCHARGE TUBES

Vladislav Bubeník, Zlin, Bohemia and Moravia; vested in the Alien Property Custodian

Application filed July 7, 1941

The present invention relates to electric discharge tubes filled with gases, or vapors, or mixture of gases and/or vapors, and the object of the invention is to provide a hot electrode for electric discharge tubes of the specified type.

In order to start the discharge in electric discharge tubes filled with gases, or vapors, or mixtures of gases and/or vapors at a potential as low as possible it is necessary to promote the ionization along the discharge path between the main electrodes. The desired result may be obtained by preliminary ionization of the gaseous filling in the neighborhood of the main electrodes; in the devices as heretofore known special auxiliary electrodes are used for this purpose, the auxiliary electrodes being arranged in the discharge tubes adjacent to the main electrodes. Such auxiliary electrodes as are known and used heretofore either are supplied with current from outside, or are in direct conductive communication with the one or the other end of the hot filament, the drop of potential across the auxiliary electrode and the main electrode being effective to produce ionization of the gaseous filling in the vicinity of the main electrode, wherefrom the ionization is propagated along the whole spacing between the main electrodes.

The ionization of gases and vapors depends not only on the composition of the filling and its pressure but also on the potential across the electrodes and on the spacing of the same. Therefore, when designing the main and auxiliary electrodes attention should be paid to all those factors.

Assuming that a given gaseous filling is used under a constant pressure the ionization I will be a function of the potential E and the spacing d between the electrodes

$$I=f\ (E, d)$$

Similarly the auxiliary ionization at the electrodes will be a function of the drop of potential across the hot filament of the main electrode (E_{aux}) and the spacing between the electrodes under consideration (d_{aux})

$$I=f\ (E_{aux}, d_{aux})$$

An object of the present invention is to provide a hot electrode for electric discharge tubes which is so arranged as to make superfluous the use of any auxiliary electrode.

The essence of the invention consists in that the supply itself of electric current to the hot filament acts as an auxiliary electrode; in other words the drop of potential across the lead-in wires for the electric current and the hot filament causes ionization of the gaseous charge to take place in the vicinity of the main electrode to such an extent that the potential across the two main electrodes then becomes sufficient to start the discharge.

The choice of the hot filament according to the present invention is determined by the lowest necessary drop of potential across the filament (equal to the required potential for the auxiliary ionization), and the distance dx (Fig. 1) between the hot filament and the lead-in wire may be deducted from the above mentioned relation:

$$dx=f\ (E_{aux})$$

The drawing illustrates by way of example several embodiments of the invention.

The electrode shown in Fig. 1 represents a simple practical form of the hot electrodes according to the invention. The ionization takes place between the points A and B. The required potential for the ionization is provided by the drop of potential itself across the points A and B on the hot filament. The ionization takes place only when the point A is positive with respect to the point B. With alternating current this condition is complied with only during one of the two half-waves.

In the embodiment shown in Fig. 2 the electrode is so designed as to be exactly symmetrical so that the ionization does not depend on the polarity of the electrode ends, since during the two half-waves of alternating current the operation is the same and the sense only is changed. Therefore the ionization takes place during either half-wave of alternating current.

Fig. 3 also shows an electrode which is symmetrical with respect to the axis and represents a modification of the electrode shown in Fig. 2. The middle part of the spiral, which is subdivided into two parts, is supported on a carrier f. Between the points I, J, K ionization takes place during both half-waves of alternating current.

Fig. 4 shows a form of the invention wherein the filament extends at right angles to the axis of the socket. In this embodiment a part only of the drop of potential across the hot filament is utilized, namely that part which corresponds to the points M and N.

Ionization takes place during either half-wave of alternating current.

The electrode shown in Fig. 5 represents substantially a combination of the electrodes shown in Figs. 1 and 2. The ionization is effected at two places during either half-wave.

The above described constructions may be modified within wide limits without departing from the scope of the invention.

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