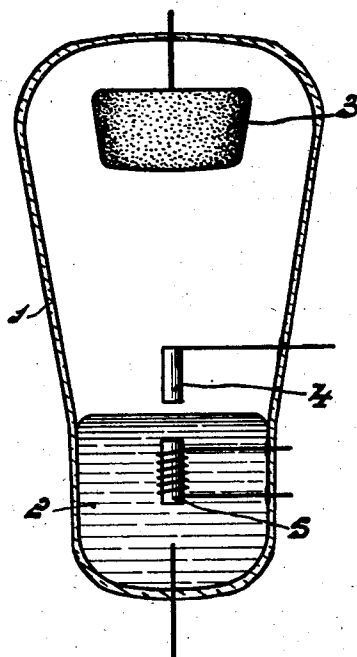


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N. WARMOLTZ
ELECTRON DISCHARGE TUBE

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INVENTOR.
NICOLAAS WARMOLTZ

BY *Frederic M. Hyl*

AGENT

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ELECTRON DISCHARGE TUBE

Nicolaas Warmoltz, Eindhoven, Netherlands, assignor to Hartford National Bank and Trust Company, Hartford, Conn., as trustee

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4 Claims. (Cl. 250—27.5)

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This invention relates to devices comprising an electric discharge tube having a mercury cathode and an ignition electrode arranged over the cathode surface which initiates the discharge by a high voltage applied thereto.

In order to ensure ignition in devices of the aforesaid kind, high voltages are required, since in view of variations in the level of the cathode, inter alia due to capillary waves, the distance between ignition electrode and cathode surface must be comparatively large.

It is known to bring about ignition by splashing the ignition electrode arranged over the cathode surface with cathode liquid by agitating the latter or by moving the ignition electrode towards the cathode surface by electrostriction. Since the ignition is effected in such devices by interrupting a current between a solid electrode and a liquid cathode, material soiling is liable to occur. Furthermore, the devices for agitating the cathode liquid or the ignition electrode itself are comparatively complicated.

According to the present invention, in devices comprising an electric discharge tube having a mercury cathode and an ignition electrode arranged over the cathode surface and to which a high voltage is applied to ensure ignition, the surface of the cathode is set into vibration. This ensures that waves and sharp points are produced on the cathode surface, resulting locally in an increased field strength between cathode and ignition electrode. Thus, the ignition may be produced by considerably lower voltages across the ignition electrode than in the case of a smooth cathode-surface.

The frequency of the vibrations of the cathode surface is preferably chosen to be at least ten times the required frequency of the discharge, in order to ensure that the ignition takes place a very short time after the application of the ignition voltage. The surface of the cathode may be set into vibration by immersing in the cathode liquid an element which is deformed under the action of magnetostriction, or the element may be coupled to an ultrasonic generator.

In order that the invention may be more clearly understood and readily carried into effect, one example will now be described with reference to the accompanying drawing, which shows a liquid cathode electric discharge tube having a vibratory element immersed in the cathode liquid.

In the accompanying drawing, the discharge tube has a glass envelope 1, a mercury cathode 2 and a graphite anode 3.

An ignition electrode 4 is provided at a distance

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of a few millimetres from the cathode 2. A nickel tube 5 is immersed in the cathode 2 and is surrounded by an insulated coil through which a current of the desired frequency may be supplied, with the result that the nickel tube exhibits magnetostriction in the direction of its length and the surface of the cathode is set into vibration. The ripple effect may be produced either at the desired moment of ignition, after a voltage has been applied to the electrode, or there may be a continuous ripple effect produced in which event a voltage pulse is supplied to the ignition electrode at the desired moment of ignition.

What I claim is:

1. A device comprising an electric discharge tube having an envelope, an anode electrode positioned within said envelope, a liquid mercury cathode spaced from said anode electrode within said envelope and having a surface portion of given level facing said anode, means to produce ripples at said surface of said liquid cathode to vary said surface level above and below said given level, and an ignition electrode spaced from the given surface level of said liquid cathode at a distance greater than the height of said ripples whereby on application of a voltage between the said ignition electrode and the said cathode a discharge occurs between said ignition electrode and cathode and tube ignition is effected.

2. A device comprising an electric discharge tube having a given discharge frequency, said tube having an envelope, an anode electrode positioned within said envelope, a liquid mercury cathode spaced from said anode electrode within said envelope and having a surface portion of given level facing said anode, means to produce ripples of a frequency substantially ten times that of said discharge frequency at said surface of said liquid cathode to vary said surface level above and below said given level, and an ignition electrode spaced from the given surface level of said liquid cathode at a distance greater than the height of said ripples whereby on application of a voltage between the said ignition electrode and the said cathode a discharge occurs between said ignition electrode and said cathode and tube ignition is effected.

3. A device comprising an electric discharge tube having an envelope, an anode positioned within said envelope, a liquid mercury cathode spaced from said anode within said envelope and having a surface portion of given level facing said anode, magnetostriction means to produce ripples at said surface of said liquid cathode to vary said

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surface level above and below said given level, and an ignition electrode spaced from the given surface level of said liquid cathode at a distance greater than the height of said ripples whereby on application of a voltage between the said ignition electrode and the said cathode a discharge occurs between said ignition electrode and said cathode and tube ignition is effected.

4. A device comprising an electric discharge tube having an envelope, an anode positioned within said envelope, a liquid mercury cathode spaced from said anode within said envelope and having a surface portion of a given level facing said anode, a magnetostrictive element and an exciter therefor within said liquid cathode to produce ripples at said surface of said liquid cathode to vary said surface level above and below said given level, and an ignition electrode spaced from the given surface level of said liquid cathode

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at a distance greater than the height of said ripples whereby on application of a voltage between the said ignition electrode and the said cathode a discharge occurs between said ignition electrode and said cathode and tube ignition is effected.

NICOLAAS WARMOLTZ.

REFERENCES CITED

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

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