Aug. 1, 1950 F. PRAKKE 2,517,023

SHIELDING FOR ELECTRIC DISCHARGE TUBES

Filed July 8, 1946

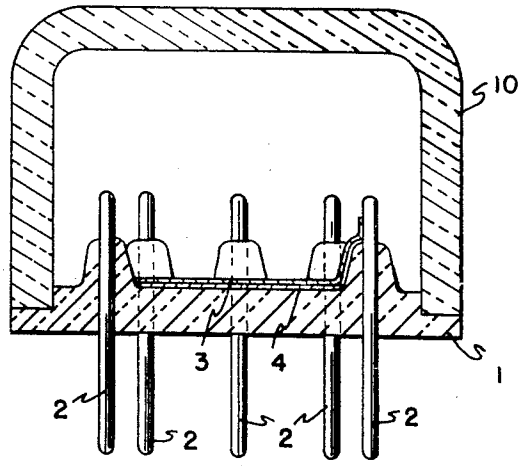

FIG. 1

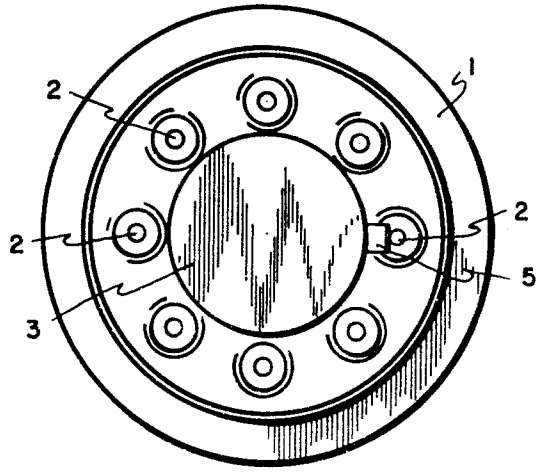

FIG. 2

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Patented Aug. 1, 1950 2,517,023

UNITED STATES PATENT OFFICE

2,517,023

SHIELDING FOR ELECTRIC DISCHARGE TUBES

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Application July 8, 1946, Serial No. 681,816
In the Netherlands April 6, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires April 6, 1963

6 Claims. (Cl. 250—27.5)

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In electric discharge tubes and incandescent lamps it is commonly known to make use of conductive coatings provided on glass parts of these tubes or lamps. These coatings may, for instance, be used as screening means, as an electrode or as a joint between two or more other conductors inside the tube.

Various methods have come to be known to attach these coatings to the glass wall, a distinction being made between coatings applied to the outer wall of the tube or lamp and coatings provided on the inner wall thereof. Thus, for instance, use may be made of hoods or plates which are laid against the wall of the tube without any further fastening means. This method can only be used in the case of external coatings which are then slipped as hoods on the wall of the tube. Another fastening method consists in spraying or in fastening these coatings by electrolysis, cataphoresis or similar methods. These layers may often be applied either on to the outer wall or on to the inner wall, but this involves the drawback of the required connection to an electrode through the intermediary of contact members being extremely difficult.

It is already known to provide a screen on the inner wall of the bulb of an electric discharge tube parallel with a part of the wall and to secure this screen to one of the inlet conductors, it further bearing loosely on this wall portion. This yields very unsatisfactory results, since the contact with the wall is not intimate. In degasifying the electrodes and other parts by induction of high frequency currents this involves locally an excessive temperature, i. e., where the screen bears on the wall, and, as a consequence thereof, cracking of the glass. The various aforesaid drawbacks can be met by making use of an electric discharge tube or incandescent lamp according to the present invention, within which a thin metal coating is secured to the glass wall by means of enamel.

When utilizing this tube construction use may be made of a thin coating which is very regularly connected to the adjacent wall of the tube. This yields the advantage of preventing irregularities and consequently cracking of the adjacent glass and in addition the said screen, in the case of using this coating as shielding means, contacts very intimately with the glass wall which has a very favourable effect on the shielding. In fact, when using a loose screen this must be spaced apart from the wall of the tube to prevent cracking, i. e. there is an air-gap between the screen and the wall, due to which the shielding is lacking over a certain length of the supply conductors.

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The thickness of the layers may be different. As a rule it is reduced as much as possible. Thus, for instance, the thickness of the conductive coating does not exceed 50 microns, the thickness of the enamel usually amounting to 0.1 to 0.5 mm. With these thicknesses of the layer the coefficients of expansion of the glass of the tube wall, of the enamel and of the coating must be adapted to each other. Solely in the case of these layers being extremely thin a difference in coefficient of expansion is permissible. This holds in the case of thicknesses of the coating of less than 10 microns and thicknesses of the layer of enamel of the order of magnitude of 0.1 mm. and less.

The invention may be used very advantageously with discharge tubes having a flat glass bottom on to which a thin foil, for instance of chrome-iron, is applied by means of enamel. As enamel use may be made of various vitreous materials whose choice usually depends on the material from which the adjacent wall part is made. Advantageously use may be made of a combination of lead glass or lime glass and a lead-borate enamel having a composition: 65% by weight of PbO, 22.4% by weight of B_2O_3 and 12.6% by weight of SiO_2; in this case the coefficients of expansion of the glass and the enamel substantially agree, chrome iron being a very suitable coating material. In this event these coefficients of expansion are about 90 to 100×10^{-7}. In the case of parts of the tube made from hard glass having a much lower coefficient of expansion, namely of about 40×10^{-7}, the shielding means may be fastened with the aid of enamel having the following composition: 17% by weight of SiO_2, 23% by weight of B_2O_3, 25% by weight of PbO, 10% by weight of ZnO and 25% by weight of MnO_2. If in this case a metal must be chosen, whose coefficient of expansion is substantially matched to that of the glass and the enamel, the coating may, for instance, consist of tungsten or molybdenum.

The invention will now be more fully explained by reference to the accompanying drawing, given by way of example, in which Fig. 1 is a section of the flat bottom of an electric discharge tube according to the invention, whereas Fig. 2 is a plan thereof.

In the drawing the reference number 1 denotes the flat bottom of an electric discharge tube into which is sealed a certain number of supply conductors 2. On the bottom is provided a chrome

iron shielding foil 3 which is secured to the bottom by means of a thin layer 4 of enamel. To connect the shielding means to a sealed contact member this foil is furnished with a tag 5 which is welded to one of the contact members 2. In this way the contact between the shielding means and the supply conductor is established very easily also when making use of this shielding method.

What I claim is:

1. An electric discharge device comprising a vitreous envelope portion; a conductive foil having a thickness of less than about 50 microns overlying at least a part of said vitreous portion; and a layer of vitreous enamel having a thickness between about 0.1 mm. and about 0.5 mm. between said foil and said vitreous envelope portion binding said foil thereto.

2. An electric discharge device comprising a vitreous envelope portion; a foil of chrome iron overlying a part of said vitreous portion; and a layer of lead-borate enamel between said foil and said vitreous envelope portion binding said foil thereto.

3. In an electric discharge tube which includes an envelope, the combination comprising a hard glass portion of said envelope; a conductive foil of tungsten having a thickness of less than about 50 microns overlying at least a part of said hard glass portion; and a layer of vitreous enamel having a thickness between about 0.1 mm. and about 0.5 mm. between said tungsten foil and said hard glass envelope portion binding said foil thereto.

4. In an electric discharge tube which includes an envelope, the combination comprising a hard glass portion of said envelope; a conductive foil of molybdenum having a thickness of less than about 50 microns overlying at least a part of said hard glass portion; and a layer of vitreous enamel having a thickness between about 0.1 mm. and about 0.5 mm. between said molybdenum foil and said hard glass envelope portion binding said foil thereto.

5. In an electric discharge tube which includes an envelope, the combination comprising; a hard glass portion of said envelope; a conductive foil of tungsten having a thickness of less than about 50 microns overlying at least a part of said hard glass portion; and a layer of vitreous enamel consisting by weight of essentially about 17% of SiO_2, 23% of B_2O_3, 25% of PBO, about 10% of ZnO and about 25% of MnO_2 and having a thickness between about 0.1 mm. and about 0.5 mm. between said tungsten foil and said hard glass envelope portion binding said foil thereto.

6. In an electric discharge tube including an envelope, the combination comprising: a vitreous portion of said envelope; a foil of chrome iron overlying a part of said vitreous portion; and a layer of lead-borate enamel consisting by weight of essentially about 65% of PBO, about 22.4% of B_2O_3 and 12.6% of SiO_2 between said chrome iron foil and said vitreous envelope portion binding said foil thereto.

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