

Aug. 15, 1933.

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1,922,674

INSULATION IN ELECTRIC DISCHARGE TUBES

Filed April 24, 1928

Fig. 1

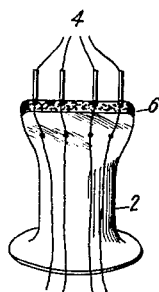


Fig. 2

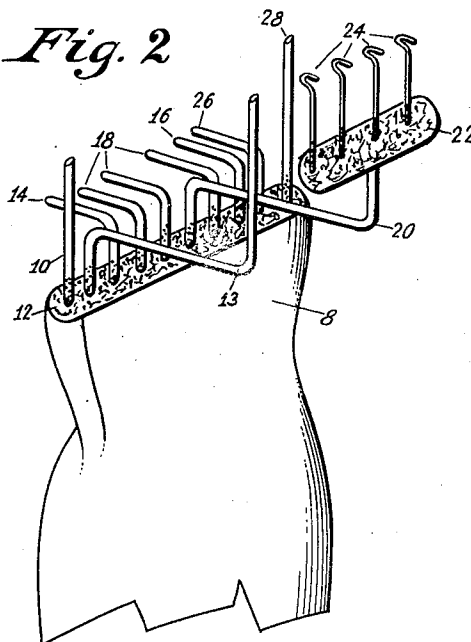


Fig. 3

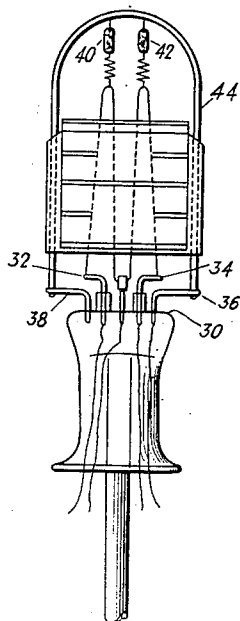
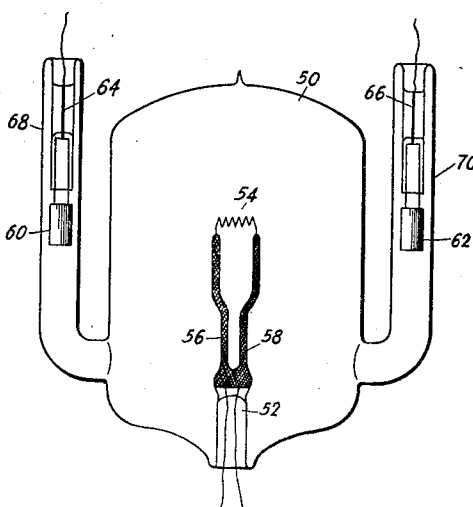


Fig. 4



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INSULATION IN ELECTRIC DISCHARGE TUBES

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Application April 24, 1928, Serial No. 272,390,
and in the Netherlands May 7, 1927

2 Claims. (Cl. 250—27.5)

The invention aims to improve the insulation of the vitreous connecting pieces between those parts of electron discharge tubes which during operation have a potential difference relative to one another, and to reduce the electrical leakage from lead wires or other live metal members which do not act as electrodes.

According to the invention, the process of improving the insulation of the vitreous supports or connecting pieces between those parts of electron discharge tubes which during operation have a potential difference relative to one another, and of reducing the electrical leakage from lead wires or other live metal members which do not act as electrodes, consists in glazing or coating these supports or connecting pieces and these metal members with a vitrified enamel. According to the invention, use is preferably made of an insulating and protecting vitreous enamel which has a relatively low melting point. Good results have been obtained with an enamel which consists principally of and contains a high percentage of lead oxide or boron oxide or both these substances.

The invention will be more clearly understood by referring to the accompanying drawing, in which:

Figure 1 represents an elevation of a stem of a triode;

Figure 2 represents on an enlarged scale a perspective view of a stem of a triode adapted to receive a very large filament;

Figure 3 is an elevation of a stem of a so-called diode; and

Figure 4 represents an elevation of a two-phase rectifier.

In Fig. 1, the numeral 2 denotes the glass stem of an electron discharge tube, and 4 represents conductors or lead wires sealed into and projecting from the stem. The lead wires and the surface 6 of the glass stem 2, which may be made of either the lead glass or lime glass commonly used in this art, and which is located between the lead wires are coated with an enamel which has a melting point relatively low in comparison with glass, and which melts at a temperature below that at which the glass of the stem softens.

In Fig. 2, 8 is the press of the stem of a three-electrode tube; 10 is the supporting wire for the anode; 13 is the lead wire of the grid; 14 and 16 are the leading-in wires for the heating current; 18 designates the filament supports; and 20 designates a filament support carrying a

vitreous support or connecting member 22 of lead glass or lime glass or quartz, which, in accordance with the invention, is coated with enamel. The connecting member 22 bears the filament supports 24 which co-operate with the opposite supports 18. 26 is the grid support and 28 the lead wire for the anode. The surface of the vitreous member 22 is enamelled and also the adjacent portions of the filament supports 24 and the filament support 20 are coated with enamel. In addition, the surface 12 of the press and at least the adjoining portion of the lead wires sealed into the press are also coated with enamel.

In Fig. 3, the surface 30 of the press, and in addition, the lead wires 32, 34 and 36 and the support 38 which are sealed into this press, are coated for the above mentioned purposes with enamel. At one side, the filament is secured to the lead wires 32 and 34 and at the other side to connecting member (glass or quartz beads) 40 and 42, which are coated with enamel and which in their turn are connected to the anode support 44, the latter being secured to the anode lead wire 36. The connecting pieces 40 and 42 are enamelled because they connect the filament to the plate 44, which members during operation have a potential difference relative to each other.

Fig. 4 represents a two-phase rectifier. Into the bulb 50 is sealed the stem 52 on which is mounted the incandescent cathode 54 which is supported on the press of the stem by means of the lead wires 56 and 58. The anodes 60 and 62 are mounted on the lead wires 64 and 66 which are sealed into the ends of the arms 68 and 70. At least the upper surface of the stem 52 and the lead wires 56 and 58 are entirely or partly coated with the insulating and protecting enamel.

The application of the enamel can be effected by stirring a mixture of its components with a little water, by applying the paste thus produced to the appropriate portions of the electron discharge tube, by drying the said paste, and then melting it by heating the stem to a temperature somewhat below the softening point of glass.

Good results have been obtained with an enamel of about the following composition:

	Percent
Boron oxide.....	15
Lead Oxide.....	72
Silicon dioxide.....	7
Aluminium oxide.....	1
Tin oxide.....	2
Zinc oxide.....	3

This enamel has a melting point of about 450° C. which is below the softening temperature of the glass used for the stems and other parts of electron discharge tubes.

5 What is claimed,

1. An electron discharge device comprising an envelope enclosing cooperating electrodes, a glass stem projecting into said envelope and having a press, metal conductors sealed into and projecting from said press, and a coating of insulating glaze consisting of vitrified enamel consisting principally of lead oxide and boron oxide and with a melting point slightly below the softening temperature of said press covering the end of said press between said conductors and the portion of said conductors adjoining said press.

2. An electron discharge device comprising an

envelope enclosing cooperating electrodes and having therein a glass support for at least one of said electrodes, a pair of metal conductors sealed into and projecting from said support and connected to have during operation of said device a potential difference relative to each other, the projecting portion of said conductors adjoining said support and the surface of said support between said conductors being coated with a vitreous glaze of vitrified enamel having a melting point slightly lower than the temperature at which said glass support becomes plastic and consisting principally of lead oxide with boron oxide equal in amount to about one fifth of the lead oxide.

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CERTIFICATE OF CORRECTION.

Patent No. 1,922,674.

August 15, 1933.

JOHANNES GYSBERTUS WILHELM MULDER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, lines 34 and 50, for "steam" read stem; and line 76, for "member" read members; and line 80, for "pieces" read members; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of December, A. D. 1933.

F. M. Hopkins

Acting Commissioner of Patents.

(Seal)

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