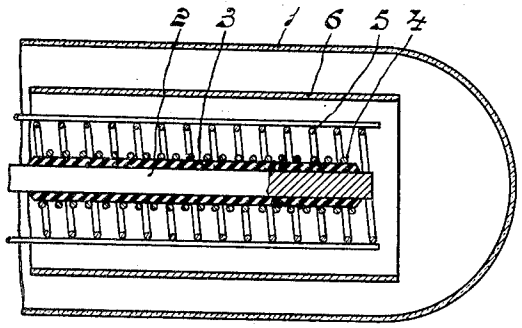
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HIGH-VACUUM DISCHARGE TUBE

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INVENTOR

NICOLAAS WARMOLTZ

BY Fred M Vogel

AGENT

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HIGH-VACUUM DISCHARGE TUBE

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

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3 Claims. (Cl. 313—233)

This invention relates to a high-vacuum discharge tube, more particularly, to high-vacuum discharge tubes comprising a cold cathode and an anode arranged on either side of an insulator. Tubes of the foregoing type are suitable in a rectifying system for rectifying comparatively low currents at high voltages. However, such a system suffers from the drawback that large variations in the supply voltages cause undesirable variations in the output voltage. Such tubes are also described in my earlier application Serial No. 255,096, filed Nov. 6, 1951, now Pat. No. 2,686,888.

The main object of the invention is to improve the operating characteristics of such tubes.

According to the invention, a high-vacuum discharge tube comprises a cold cathode and an anode arranged on opposite sides of an insulator such that the cold cathode covers a smaller distance on one side of the insulation than the anode and the boundary line cathode-insulator-vacuum faces the anode on the other side of the insulator. An auxiliary electrode is provided at a certain distance from the cathode and a control grid is disposed between the auxiliary electrode and the cathode. This arrangement permits controlling the current between the anode and the cathode in a simple manner and with little energy by applying a control-voltage to the grid. Consequently, in the event of great variations in the supply voltage of a rectifying system in which the tube is employed, an adequately constant output voltage is obtainable by varying the control-voltage as a function of the output voltage.

The invention will now be described with reference to the accompanying drawing which shows a discharge tube according to the invention.

Referring to the drawing, the high-vacuum discharge tube of the invention comprises an envelope 1, e. g. of glass, a rod-shaped anode 2, an insulator 3 on the anode 2, a helically-wound cathode wire 4 disposed on the insulator 3, a control grid 5 surrounding and spaced from the cathode 4, and an auxiliary electrode 6, which is usually connected to the anode 2 during operation, in turn surrounding the grid 5.

The insulator 3 preferably consists of silica or hard glass.

The cathode 4 extends for a shorter distance over the insulator 3 than does the anode 2. The boundary line cathode-insulator-vacuum, which is defined as the line which forms the border of the cathode surface on the insulator within the vacuum space (a border of a cathode surface sandwiched between two insulators would not emit), faces the anode 2 on the other side of the insulator 3. The anode may operate with voltage differences relative to the cathode of 10 kv.–20 kv. eff. value. The negative grid voltage should amount to about 200 v. eff. The rectified current may amount to about 100 μa.

While we have described our invention in connection with specific embodiments and applications, other modifications thereof will be readily apparent to those skilled in this art without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A high-vacuum discharge tube comprising an insulator, an anode disposed on and contacting one side of said insulator, a cold cathode disposed on and contacting the opposite side of said insulator and a smaller surface of the insulator than the anode, at least one surface portion of said cathode defining with said insulator a boundary line, said boundary line facing the anode and the latter extending beyond the line, an auxiliary electrode disposed a given distance from the cathode, and a control-grid disposed between the cathode and the auxiliary electrode, said control grid and cathode defining a space therebetween free of other conductive members.

2. A high-vacuum discharge tube as claimed in claim 1 in which the cathode is a helically-wound wire on the outside of the insulator, and the anode is a rod extending through the insulator.

3. A high-vacuum discharge tube comprising an elongated cylindrical hollow insulator, an anode rod disposed inside said insulator and in contact therewith and having a portion extending outside of said insulator, a helical cold cathode wire wound on the outer surface of said insulator and covering a smaller area of the insulator than the anode, at least one surface portion of said cathode defining with said insulator a boundary line facing said anode, a control grid enclosing said cathode and spaced therefrom, said control grid and cathode defining a space therebetween free of other electrodes, and a solid cylindrical auxiliary anode enclosing said control grid and connected to said anode rod.

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