

Oct. 9, 1934.

J. BRUIJNES ET AL
ELECTRIC DISCHARGE TUBE

1,976,385

Filed April 15, 1929

Fig. 1.

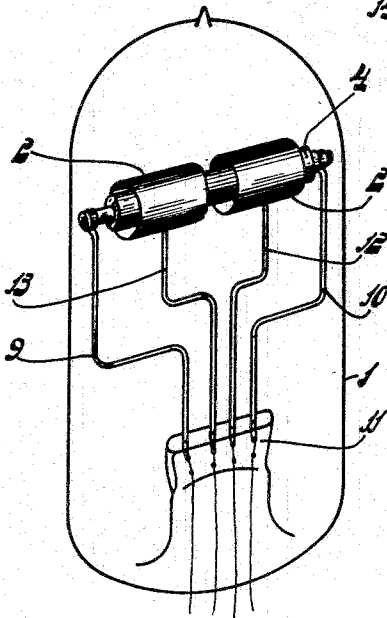
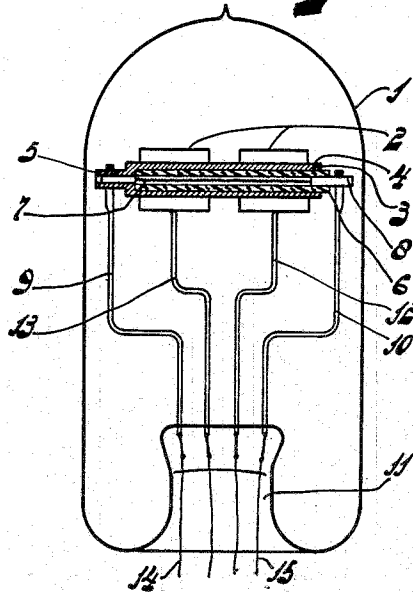


Fig. 2.

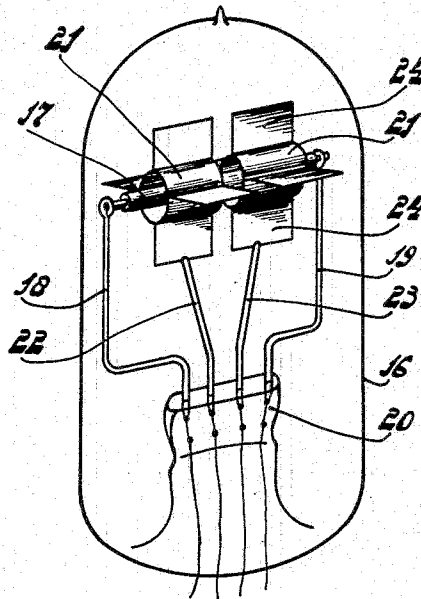


Fig. 3.

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UNITED STATES PATENT OFFICE

1,976,385

ELECTRIC DISCHARGE TUBE

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Application April 15, 1929, Serial No. 355,354
In the Netherlands June 19, 1928

5 Claims. (Cl. 250—27.5)

The invention relates to electric discharge tubes, more particularly to those adapted to rectify alternating currents.

In many cases it is desirable that the anode of such an electric discharge tube should surround the incandescent cathode. For this purpose electric discharge tubes have been manufactured in which the anode is constructed as a cylinder which surrounds the incandescent cathode. With such construction of a discharge tube wherein a plurality of anodes is arranged side by side, the inconvenience is prevalent that during the operation of the tube the incandescent cathode sags due to its considerable length and is no longer located in the axis of the cylindrical anodes. Owing to this there arises the danger of a short-circuit being produced between the cathode and the anodes; accordingly, it would be necessary to increase the distance between the cathode and the anodes thereby resulting in increasing the internal resistance between the incandescent cathode and the anodes.

The invention has for its object to obviate the said inconveniences.

According to the invention, an electric discharge tube adapted to rectifying alternating currents, comprises for this purpose an indirectly heated cathode and at least two cylindrical anodes which surround the latter. Owing to its rigid construction the indirectly heated cathode does not sag so that there is no risk of a short-circuit being produced between the cathode and the anodes. As a result the distance between the cathode and the anodes may, consequently, be made smaller owing to which a small internal resistance between the cathode and the anodes is obtained. One is thus enabled to operate the discharge tube with high current intensities especially when the tube is gas-filled so that the anodes will frequently be strongly heated, also in consequence of the small diameter of the anodes and of the small heat radiating surface. In order to obtain nevertheless a sufficient radiation of heat, the anodes may be provided with cooling ribs.

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

Figures 1 and 2 represent a sectional and a perspective view of a rectifier discharge tube according to the invention.

Figure 3 represents such a tube comprising an anode provided with cooling ribs.

Referring to Figs. 1 and 2, the wall of a discharge tube is denoted by 1. This tube is adapted

to rectify both half waves of an alternating current and for this purpose it contains two anodes 2. The tube comprises an indirectly heated cathode constituted by a small metal tube 3, for example of nickel, which preferably is seamless and which is coated with a layer 4 or a substance having a strong capacity of emitting electrons, for example of barium oxide, said tube 3 having at one of its ends a narrowed portion 5. The nickel tube 3 encloses an insulating tube 6, for example of quartz, which contains a heating member constituted, for example, by a coiled tungsten wire 7. At one end, this wire is connected to the portion 5 and at the other end to a metallic rod 8, whereby the quartz tube 6 is closed. The cathode is secured, by means of supporting wires 9 and 10, to the stem 11 of the discharge tube, the anodes being also secured to this stem with the aid of supporting wires 12 and 13. The heating current for the wire 7 may be supplied by wires 14 and 15 which are connected to the supports 9 and 10 while the discharge current of the tube is supplied to the cathode via the wire 14, the supporting wire 9 and the portion 5.

The discharge tube 1 is exhausted or contains a gaseous filling, for example a mixture of argon and mercury vapour.

Figure 3 represents a discharge tube 16 comprising an indirectly heated cathode 17 carried by supports 18 and 19 which are secured to and taken out through a stem 20. The cathode is surrounded by two cylindrical anodes 21 which are supported by two supporting wires 22 and 23 and which are provided with four cooling-ribs 24. These cooling ribs increase the cooling surface of the anodes so that during the operation of the tube heat is radiated and the anodes are maintained at a sufficiently low temperature. The anodes may consist of a substance which, when heated, is capable of absorbing residual gases, for example, of zirconium, and they may be arranged at a small distance apart from the cathode, owing to which a small internal resistance of the rectifying tube is ensured.

What we claim is,

1. An electrical discharge device comprising a container, electrodes therein including two cylindrical anodes and an indirectly heated cathode consisting of a metal tube coated with a layer of a substance having a high electron emissive capacity, an insulating tube containing a heating member enclosed in said metal tube, said heating member being electrically connected at one end to the metal tube and at the other end to a metallic

rod, said rod being disposed in one end of the insulating tube, a support connected to said metallic rod, and a second support connected to the metal tube, said anodes being alined along the length of the cathode and closely surrounding same.

2. An electrical discharge device comprising a container, electrodes therein including two cylindrical anodes and an indirectly heated cathode, said cathode comprising a metallic tube coated with a layer of a substance having a high electron emissive capacity, said metallic tube surrounding an insulating tube and comprising an end portion for closing one end of the insulating tube, a heating member consisting of a coiled wire disposed within said insulating tube, said heating member being electrically connected with one of its ends to the metallic tube and with the other end to a metallic rod, said rod projecting into the open end of the insulating tube, a support for said metallic rod and a second support for said end portion of the metallic tube, said anodes being alined along the cathode and closely surrounding the same.

3. An electrical discharge device comprising a container, electrodes therein including two cylindrical anodes and an indirectly heated cathode, said cathode comprising a metal tube coated with a layer of a substance having a high electron emissive capacity, said metal tube enclosing an insulating tube containing a heating member, said heating member being electrically connected at one end to the metal tube and at the other end to a metallic rod, said metallic rod projecting in one end of the insulating tube, a support connected to the metallic rod and a second support connected to the metal tube, the anodes being alined along the length of the cathode and closely surrounding the same, a stem to carry the supports, the geometrical axis of the cathode being parallel to the upper surface of the stem.

4. An electrical discharge device comprising a container, electrodes therein including two cylindrical anodes and an indirectly heated cathode, said cathode comprising a metallic tube coated

with a layer of a substance having a high electron emissive capacity, said metallic tube surrounding an insulating tube and having an end portion closing said insulating tube, said insulating tube containing a heating member formed by a coiled wire, said heating member being electrically connected to the end portion of the metallic tube, a metallic rod projecting in the open end of the insulating tube and connected to the other end of the heating member, a support for the metallic rod and a second support for said end portion of the metallic tube, the anodes being alined along the length of the cathode and closely surrounding the same, and a stem to carry the supports, the geometrical axis of the cathode being parallel to the upper surface of the stem.

5. An electrical discharge device comprising a container, electrodes therein including two cylindrical anodes and an elongated indirectly heated cathode, said cathode consisting of a metallic tube coated with a layer of a substance having a high electron emissive capacity, said metallic tube enclosing an insulating tube, said insulating tube containing a heating member formed by a coiled wire, said heating member being electrically connected at one end to the metallic tube, a metallic rod fitting in one end of the insulating tube and connected to the other end of the heating member, a support for the metallic rod and a second support for the metallic tube, the anodes being alined along the length of the cathode and surrounding the same at but a slight distance, to maintain the tube resistance at a minimum, and a stem to carry said supports, the geometrical axis of the cathode being parallel to the upper surface of the stem, the exterior surface of the anode cylinders being provided with outwardly projecting cooling ribs, to dissipate the heat resulting from the resistance-decreasing close spacing of the anodes and cathode.

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