

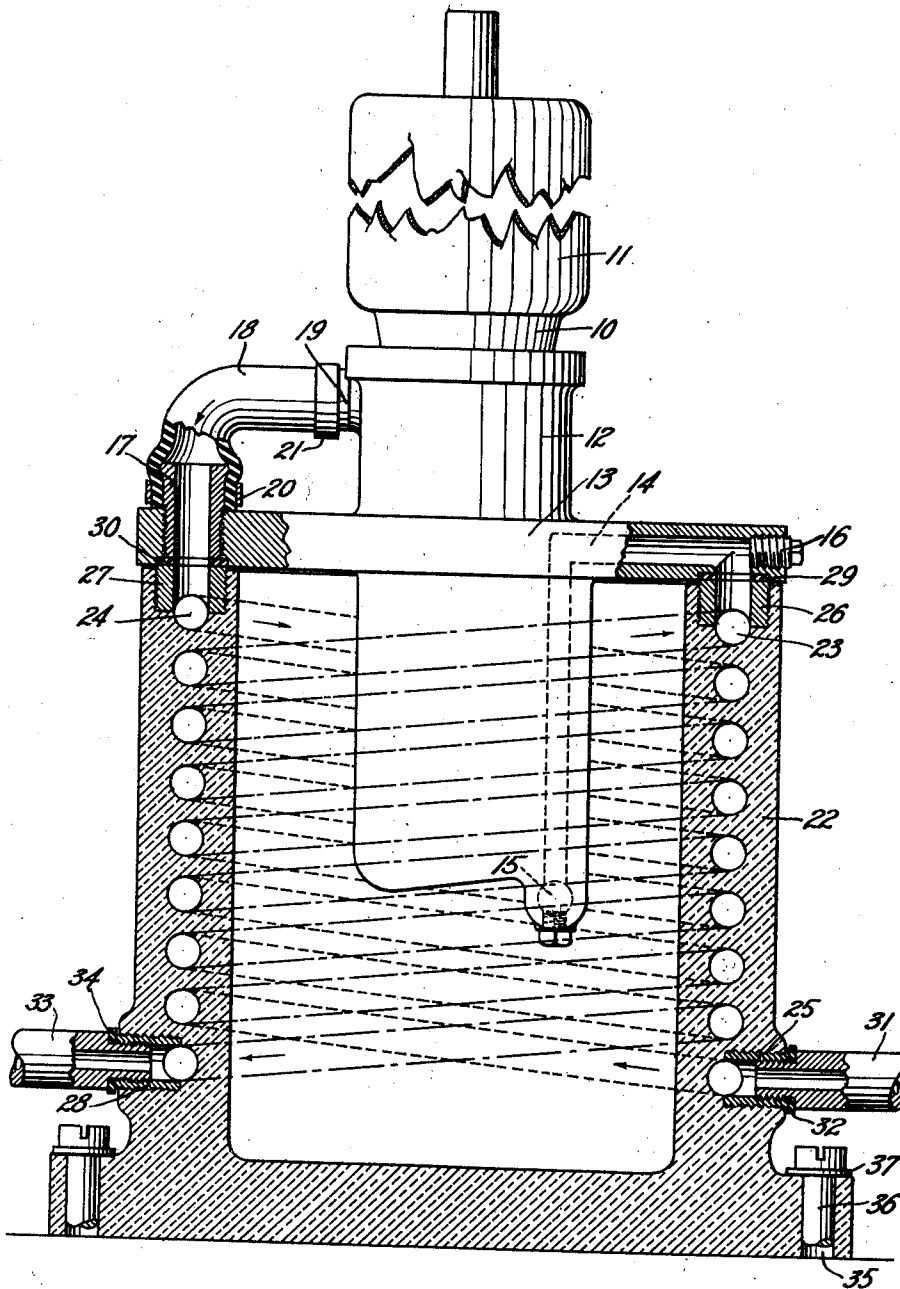
July 19, 1927.

1,635,992

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ELECTRON DISCHARGE DEVICE

Filed Oct. 4, 1924



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Patented July 19, 1927.

1,635,992

UNITED STATES PATENT OFFICE.

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ELECTRON-DISCHARGE DEVICE.

Application filed October 4, 1924. Serial No. 741,530.

This invention relates to electron discharge devices and more especially to the cooling of high power devices of the exterior anode type.

It is an object of this invention to cool effectively the anode of an electron discharge device and simultaneously insulate it from ground and associated apparatus.

It has been customary to dissipate the heat generated in devices of this character by surrounding the anode portion with a jacket and circulating therethrough a cooling medium such as water or oil under high pressure. The cooling medium passes through rubber hose of sufficient length that a high impedance path is provided between the anode and ground. This hose frequently deteriorates and cracks under the high duty to which it is subjected, thereby preventing the free circulation of the cooling medium.

According to this invention, a water jacket for the electron discharge device is supported by a unitary structure in the walls of which are provided water circulating passages. The supporting structure consists of a cylindrical structure of molded insulating material through which are provided a pair of continuous helical passageways for the circulation of the cooling medium. The inlet and outlet ports are provided with metallic inserts to establish positive water-tight joints with the flange on the water jacket and also with the source of supply. This arrangement provides a compact unit in which the molded frame is utilized for supporting the water jacket and providing tight connections for the circulating system. Furthermore, this arrangement eliminates any clogging of the passageways, insures a high degree of heat radiating surface for the cooling fluid, is not subject to deterioration, has a high dielectric strength, and the high impedance path of the frame and the column of cooling liquid effectively insulates the electron discharge device from ground.

In the drawing the single figure, partly in cross-section, illustrates one embodiment of this invention.

Referring to the drawing, an electron discharge device of the external anode type, such as is described and claimed in W. G. Houskeeper U. S. application, Serial No. 396,014, filed July 13, 1920, entitled "Elec-

tron discharge device", consists of a containing vessel having a metal portion 10 and a glass portion 11. A metallic water jacket 12 of the type disclosed and claimed in my co-pending application Serial No. 666,272, filed October 3, 1923, entitled "Tube mounting" surrounds the anode 10 and is provided with an integral flange 13 intermediate the ends thereof. A tubular passageway 14 is cast in the flange 13, and communicates with the inlet port 15 of the water jacket 12. This passageway extends to the periphery of the flange 13 and is provided with an outlet on the lower side of the flange. A threaded plug 16 closes the peripheral opening of the passage 14. This construction facilitates the casting of the jacket and furthermore permits easy access to the passageway 14 for cleaning purposes. The flange 13 is provided with a threaded aperture diametrically opposite the passage 14, into which a tapered metallic sleeve 17 is threaded. The sleeve 17 projects above the surface of the flange 13 and provides means for connecting a short length of flexible tubing 18 with the outlet port 19 on the water jacket. Metallic bands 20 and 21 securely clamp the flexible tubing 18 to the sleeve 17 and outlet port 19, respectively.

The supporting structure 22 comprises a cylindrical frame of molded insulating material, such as porcelain or other highly vitrified material. A pair of continuous helical passageways 23 and 24 are provided in the molding process by any method well-known in the molding art. These passageways are in alignment within the wall of the casing 22 and are provided with outlets at the upper and lower ends of the casing. During the molding process a plurality of metallic sleeves or inserts 25, 26, 27 and 28 are embedded in the molded material to reinforce the molded frame and prevent fracture thereof. These sleeves are provided with a knurled exterior surface whereby the insert is rigidly held in the molded material. The sleeves 25 and 26 form the inlet and outlet ports of the helical passageway 23 and the sleeves 27 and 28 form the inlet and outlet ports of the passageway 24. After the molding operation, the frame is baked in a furnace in the usual manner, and the interior surface of the passageways as well as

the surface of the frame is highly glazed. This glazing provides a smooth and non-porous surface which will repel any accumulation of foreign matter which would tend to clog the passageways.

The flange 13, on the water jacket being of large diameter can be directly fastened to the cylindrical frame 22 by any convenient means, thereby effectively supporting the water jacket from the insulating frame. The passageway 14 and the metallic sleeve 17 are situated so that they may be readily aligned with the metallic sleeves 26 and 27 in the insulating frame 22. However, in order to secure a fluid tight connection between these members, a rubber gasket 29 is provided between the opposing faces of the flange and the metal insert 26. A similar rubber gasket 30 is inserted between the threaded sleeve 17 and the metallic insert 27. The connection 31 from the water supply may be threaded into the insert 25 and a rubber gasket 32 provides a tight connection at this joint. The outlet connection 33 is similarly connected to the insert 28 by gasket 34. The molded base of the frame is provided with a number of apertures 35, through which bolts 36 pass to fasten the base to a supporting frame work. A lead gasket 37 is inserted between the head of the bolt 36 and the surface of the porcelain base to prevent fracture of the base.

The cooling fluid is supplied from a pump or other high pressure device and is circulated through the passageway 23 to the water jacket inlet 15 and around the anode to the outlet port 19, through flexible connection 18 and passageway 24. Since the cooling fluid carries off the heat dissipated in the anode the walls of the molded frame provides a means of radiating this heat thereby lowering the temperature of the cooling fluid which may be returned to the pump and used again.

Although this invention has been described with respect to a particular construction, it is, of course, understood, that various modifications may be made in the detailed construction without departing

from the scope of this invention as defined in the appended claims.

What is claimed is:

1. In combination, an electron discharge device, a water jacket having a flange, said flange having a recess, a support for said jacket, comprising a molded frame surrounding said jacket and having a helical passage formed therein, and means for providing a fluid tight connection between said recess and said passage.

2. In combination, an electron discharge device, a water jacket having a large diameter flange, said flange having a tubular passage communicating with said water jacket, a supporting structure of molded material surrounding said jacket and providing seating surface for said flange, and passageways in said molded material to provide free circulation of a cooling medium to and from said water jacket.

3. In combination, an electron discharge device, a water jacket having an apertured flange intermediate the ends thereof, said flange having an internal passage communicating with said jacket, a cylindrical molded porcelain frame having a plurality of separate helical passageways formed therein, means for providing fluid tight connections between said flange and said frame, and means for circulating a cooling fluid through said passageways, whereby heat absorbed from the discharge device is radiated through the walls of said frame.

4. In combination, an electron discharge device, a water jacket surrounding said device and having an integral flange, said flange having a tubular recess connected to said water jacket, a support comprising a molded porcelain frame having a continuous helical passageway formed therein, and means for establishing a fluid tight connection between said recess and said passageway.

In witness whereof, I hereunto subscribe my name this 29th day of September, A. D. 1924.

ARTHUR HADDOCK.