Jan. 29, 1929. 1,700,478

A. HADDOCK

ELECTRON DISCHARGE DEVICE

Filed Nov. 20, 1922

Fig. 1.

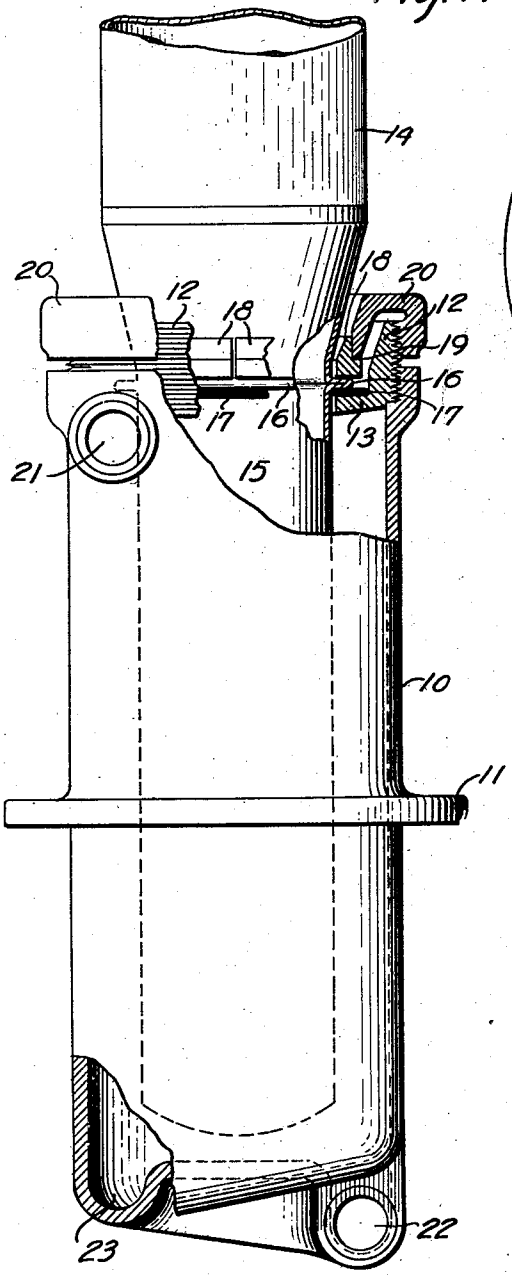


Fig. 2.

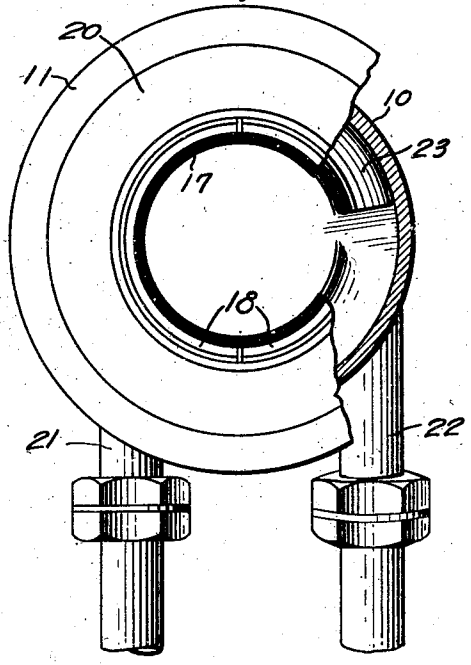
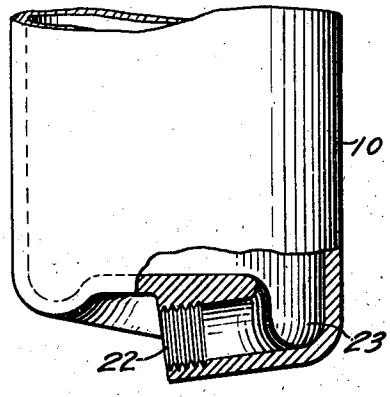


Fig. 3.



Inventor:
Arthur Haddock
by Joel Ch. Palmer Atty.

Patented Jan. 29, 1929. 1,700,478

UNITED STATES PATENT OFFICE.

ARTHUR HADDOCK, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRON-DISCHARGE DEVICE.

Application filed November 20, 1922. Serial No. 601,954.

This invention relates to electron discharge devices and more particularly to vacuum tubes of the exterior anode type and has as its object to remove efficiently from the anode the excess heat generated therein.

This invention provides a cooling device comprising a jacket having means for supporting an exterior anode electron discharge device with substantially the entire active surface of the anode exposed to the cooling fluid. The configuration of the jacket adjacent the inlet port thereof is such as to cause a cooling fluid admitted to the jacket under pressure to traverse a substantially helical path around the anode.

Other objects and novel features of the invention will be apparent from the following description and accompanying drawing wherein Fig. 1 is an elevation partially in section of the water jacket with an electron discharge device therein. Fig. 2 is a plan view of the water jacket; and Fig. 3 is a detail view of the lower end of the water jacket taken at right angles to the showing in Fig. 1.

A substantially cylindrical casing 10 having an exterior flange 11 near its mid point comprises a water jacket which is adapted to be arranged in an aperture in a frame with the flange 11 serving to support the jacket from the frame. The open end of the water jacket is interiorly threaded to receive a bushing 12 having an angular flange 13 projecting inwardly at one end, the inner wall of the bushing being divergent at the other end.

The electron discharge device 14 comprises a metallic cup-shaped portion 15 which serves as the anode of the device and a glass portion which is fused to the flared rim of the anode. Just beyond the inner end of the flared portion of the anode there is provided an outwardly extending flange 16 which comprises a closed plait formed from the metal of the anode. This plait is supported from the flange 13, there being interposed between the plait 16 and the flange 13, an annular gasket 17 of rubber or other suitable material. A two-part collar 18 surrounds the anode and rests on the plait 16. This collar is provided with an exterior shoulder 19 which is engaged by the lower rim of the annular cap 20 screwed on to the bushing 12.

In assembling this device, the bushing 12 is first screwed into the water jacket and is permanently fastened in place, the threads being sealed with solder or other suitable material. The gasket 17 is then laid on the flange 13 and the anode 15 passed therethrough until the plait 16 engages the gasket. Prior to the insertion of the anode 15 in the water jacket, the apertured cap 20 is slid over the anode. The aperture in the cap is of such diameter as to pass freely over the plait 16, but of smaller diameter than the diameter of the flare of the anode 15. The two portions of the collar 18 are then placed around the anode resting on the plait 16 after which the cap 20 is screwed on the threaded bushing and tightened until the pressure exerted by it through the collar 18 establishes a water tight connection between the plait 16 and the flange 13.

The water jacket is provided near its upper end with an outlet 21 and at its lower portion with an inlet 22, each of which is directed substantially tangential of the inner wall of the jacket. The bottom of the water jacket is shaped to provide a substantially helical channel 23 communicating with the inlet port whereby the incoming water is caused to traverse a helical path around the anode 15. The passage of the water around the anode effectively wipes off any air bubbles, thus preventing local overheating.

This type of connection between the water jacket and the anode of the electron discharge device exposes substantially all the surface of the active portion of the anode to the cooling fluid whereby heat may be readily dissipated from the anode through the cooling fluid.

The invention claimed is:

1. In combination, a cylindrical water jacket, a bushing therefor having an inwardly projecting flange, inlet and outlet ports in said jacket, an electron discharge device comprising a containing vessel having a metallic anode portion, a second flange extending outwardly from said metallic portion and resting on said first flange, means to establish a fluid-tight connection between said first and second flanges, and a helical channel formed by the walls of said jacket and leading from said inlet port.

2. In combination, a water jacket, a bushing therefor having an inwardly projecting flange, an electron discharge device comprising a containing vessel having a cup-shaped anode with a flare at one end, a flange adja-

cent said flared end, an annular cap surrounding said anode and having an aperture which passes freely over said anode flange, but having a diameter smaller than said flare, a gasket on said flange, said anode flange being seated on said gasket, a ring seated on said anode flange, said cap being screwed to said jacket, and the inner end of said cap forcing said ring against said anode flange to establish a fluid-tight joint.

3. In combination, a jacket interiorly threaded at one end, a bushing screwed into said jacket, said bushing having an inwardly projecting flange, an exterior anode electron discharge device having a flange projecting outwardly from the anode, said anode flange being supported from said first flange, a gasket interposed between said first and second flanges, a collar resting on said anode flange, a cap screwed on to said bushing and having a portion engaging said collar whereby pressure may be applied to establish a fluid tight connection between said flanges.

In witness whereof, I hereunto subscribe my name this 17th day of November A. D., 1922.

ARTHUR HADDOCK.