Jan. 26, 1926. **1,570,959**

J. O. GARGAN

TUBE MOUNTING

Filed Jan. 16, 1924

Fig. 1

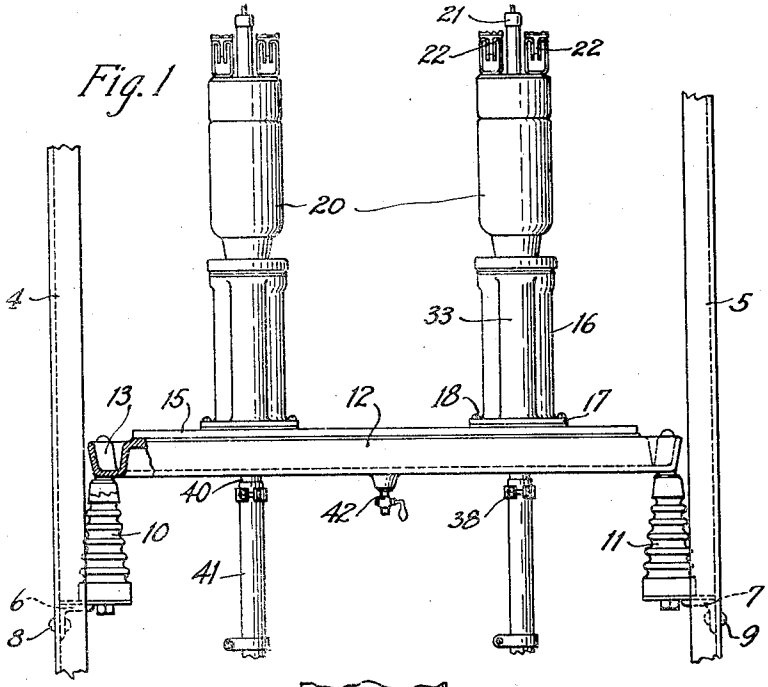
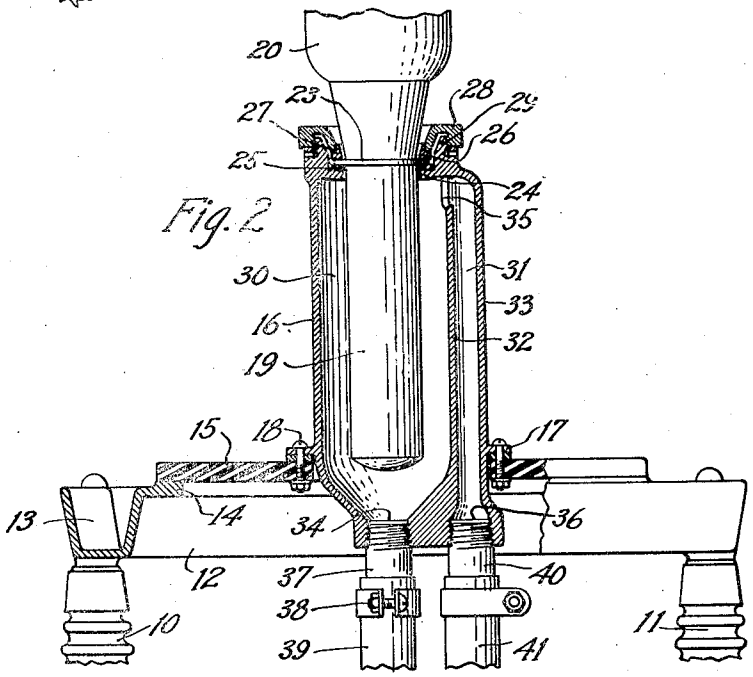


Fig. 2



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UNITED STATES PATENT OFFICE.

JOHN O. GARGAN, OF BROOKLYN, NEW YORK, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TUBE MOUNTING.

Application filed January 16, 1924. Serial No. 686,509.

To all whom it may concern:

Be it known that I, JOHN O. GARGAN, a citizen of the United States of America, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Tube Mountings, of which the following is a full, clear, concise, and exact description.

This invention relates to mountings for high voltage vacuum tubes and similar apparatus.

It is an object of the invention to provide an efficient tube mounting for high voltage tubes which is compact and of attractive appearance, is easily assembled and is readily accessible for the adjustment and replacement of parts.

Vacuum tubes of the above type are of general application in the electrical arts and have proved particularly advantageous in the field of radio transmission, for wave generation, amplification and like purposes. For such uses, the tubes are of rugged construction capable of withstanding high voltages and of carrying large currents. Frequently, provision is made for cooling the anode by circulating a cooling fluid such as water through or around it.

Heretofore, difficulty has been encountered in constructing an efficient circulating system which would provide an adequate and constant flow of water about the vacuum tube anode and at the same time allow free access to the tube mountings. Generally speaking, it has been customary to conduct the water to and from the cooling chamber through a network of pipes which because of its proximity to the tube mountings renders the parts inaccessible.

In accordance with a feature of the invention, the vacuum tube is inserted in the top of the water jacket and the water is conducted thereto by a water circulating system located entirely below the jacket.

According to another feature of the invention, a new and improved water jacket is provided having both inlet and outlet ports disposed at its lower extremity.

By means of this construction, the water is forced up through the bottom of the jacket and completely envelops the portion of the tube enclosed within the tube chamber and then flows out through the bottom of the jacket.

According to another feature of the invention, means are provided for catching and draining off any water that leaks from the jackets or that may be spilled in changing tubes.

Other features and advantages of the invention will appear from the consideration of the following description taken in connection with the accompanying drawing, in which,

Fig. 1 is a front elevation showing the invention in its preferred form, a portion of the tube shelf being shown in section.

Fig. 2 is an enlarged sectional side view showing the construction of the water jacket and the manner of connection to the water circulating system.

Referring to the drawing, the apparatus may be supported on a pair of end frames or standards 4 and 5, which may be formed of angle iron or of any other suitable construction. Cross bars or brackets 6 and 7, which may also be of angle iron are mounted upon the frames 4 and 5 by means of studs or rivets 8 and 9, respectively. A plurality of insulators 10 and 11 are mounted on the brackets 6 and 7, respectively, in any suitable manner. A shelf or supporting member 12 of substantially rectangular form and comprising a frame portion or trough 13 formed adjacent the edges thereof, is supported adjacent its ends upon the insulators 10 and 11. A substantially rectangular opening 14 in the upper face of the shelf 12 is bridged by a plate of insulating material 15 which may be secured thereto in any suitable manner. The plate 15 serves to insulate the vacuum tubes from each other when more than one tube is employed. The tubes are thus electrically separated and render it possible to insert an ammeter in the plate circuit of each tube to take individual current readings of each tube. Where it is not desired to separate the plate circuits of the tubes, a sheet of conducting material may take the place of the insulating plate 15.

One or a plurality of substantially cylindrical casings 16, each having a flange 17 near its lower end are mounted on the insulating plate 15. Each casing comprises a water jacket which rests in an aperture in the insulating plate 15 with the flange 17 serving to support the jacket in place thereon. A bolt and nut construction 18, passing

through the flange 17 and plate 15, serves to hold the water jacket firmly in place.

The electron discharge device comprises a metallic cup-shaped portion 19 which serves as the anode of the device and a glass portion 20 which is fused to the flared rim of the anode. This tube may, for example, be of the type described in the Bell System Technical Journal (New York) for July, 1922, pages 4 to 17. The glass portion of the tube extending above the jacket 16 is provided at its upper end with a grid terminal 21 and with filament terminals 22 for connection to suitable external circuits.

Just below the inner end of the flared portion of the anode there is provided an outwardly extending flange 23, (Fig. 2), which comprises a closed plait formed from the metal of the anode. This plait is supported upon an annular flange 24 projecting from the inner wall of the water jacket, there being interposed between the plait 23 and the flange 24 an annular gasket 25 of rubber or other suitable material. A collar 26 surrounds the anode and rests firmly upon the plait 23. This collar consists preferably of two semi-circular pieces in order to facilitate placing it around the anode. The two-part collar 26 is also provided with an exterior shoulder 27 which is engaged by the lower rim of an annular cap 28 which is screwed upon the upwardly extending threaded portion 29 of the water jacket. By means of this construction the tube may be assembled in the water jacket in such a manner as to establish a water-tight connection between the plait 23 and the flange 24.

Referring particularly to Fig. 2 the water jacket 16 comprises a main anode chamber 30 and a channel 31 which is formed between the wall 32 of the chamber and a narrow external wall 33. The anode chamber 30 is provided at its lower end with an inlet port 34 and is provided adjacent its top end with an opening 35 communicating with the channel 31. The channel 31 is provided at its lower end with an outlet port 36. A bushing 37 screwed into the inlet port 34 is connected by a standard hose coupling 38 with a rubber tube 39 forming a part of the water circulating system. A similar bushing 40 is screwed into the interiorly threaded wall of the channel 31 and is connected to a tube 41 of the water circulating system. Only so much of the water circulating system is shown as is thought necessary to a clear understanding of the invention. Water from a suitable source of supply is conducted through the tube 39 into the anode chamber 30 to completely surround the anode 19. The water passes from the top of the chamber 30 through the opening 35 into the channel 31 and thence through the return tube 41, the water in passing through the chamber 30 completely surrounding the anode 19. It will be seen that by means of this double-walled water jacket construction substantially all the surface of the active anode is exposed to the cooling fluid and thus heat may readily be dissipated from the anode.

The shelf 12 is designed to catch any water that may leak from the water jackets or that is spilled in changing tubes. Such water will flow into the trough 13 from which it may readily be drained by means of a drain cock 42. Since, in operation, the vacuum tube system is maintained at a very high voltage it is necessary that water escaping from the water jacket should not be allowed to flow over the apparatus or electrical connections, which is effectively prevented by the above construction.

It will be seen that by locating the entire water circulating system below the water jackets and drain shelf, free access may be had at all times to the tube mountings for the purpose of adjustment and replacement of parts. At the same time an efficient circulating system is provided to give a constant and adequate flow of water about the vacuum tube anode, insuring the ready dissipation of heat therefrom and the consequent efficient operation of the system.

Certain changes in the details of the construction herein shown and described may obviously be made without departing from the scope and spirit of the invention as defined in the appended claims.

What is claimed is:

1. A mounting for high power electric discharge tubes comprising a supporting member, a water jacket mounted on and extending entirely above said member, inlet and outlet ports in the bottom of said jacket, and a water circulating system disposed below said supporting member for conducting water to and from said ports.

2. A mounting for high power electric discharge tubes comprising a pair of end frames, insulators mounted on said frames, a rigid shelf comprising a water trough mounted on said insulators, a strip of insulating material bridging the inner ends of said shelf, a water jacket mounted on and extending above said insulating strip, inlet and outlet ports in the bottom of said jacket, and a water circulating system disposed below said shelf for conducting water to and from said ports.

3. A mounting for high power electric discharge tubes comprising a pair of end frames, insulators mounted on said frames, a rigid shelf comprising a water trough mounted on said insulators, a plate of insulating material bridging the inner ends of said shelf, a plurality of water jackets mounted on and extending above said plate, a chamber in each of said jackets having

an opening in the top thereof for the reception of a tube, inlet ports in the bottom of said chambers for admitting water thereto, a channel in each of said jackets, an opening in each of said jackets adjacent the top of the chamber to connect the chamber with the channel, outlet ports in the bottom of said channels, and a water circulating system disposed entirely below said shelf for conducting water to and from said ports.

In witness whereof, I hereunto subscribe my name this 14th day of January A. D., 1924.

JOHN O. GARGAN.