

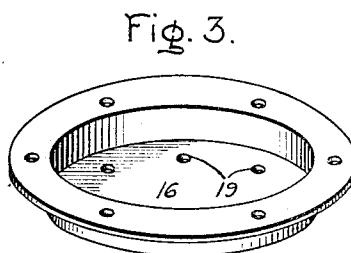
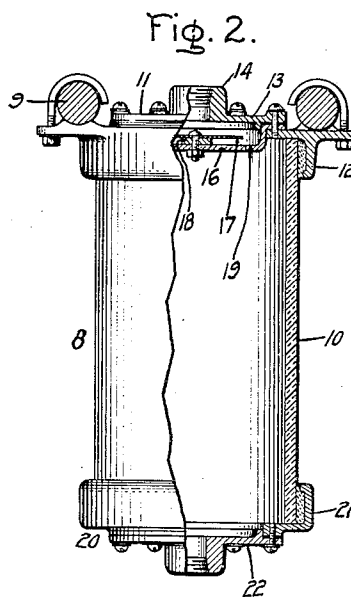
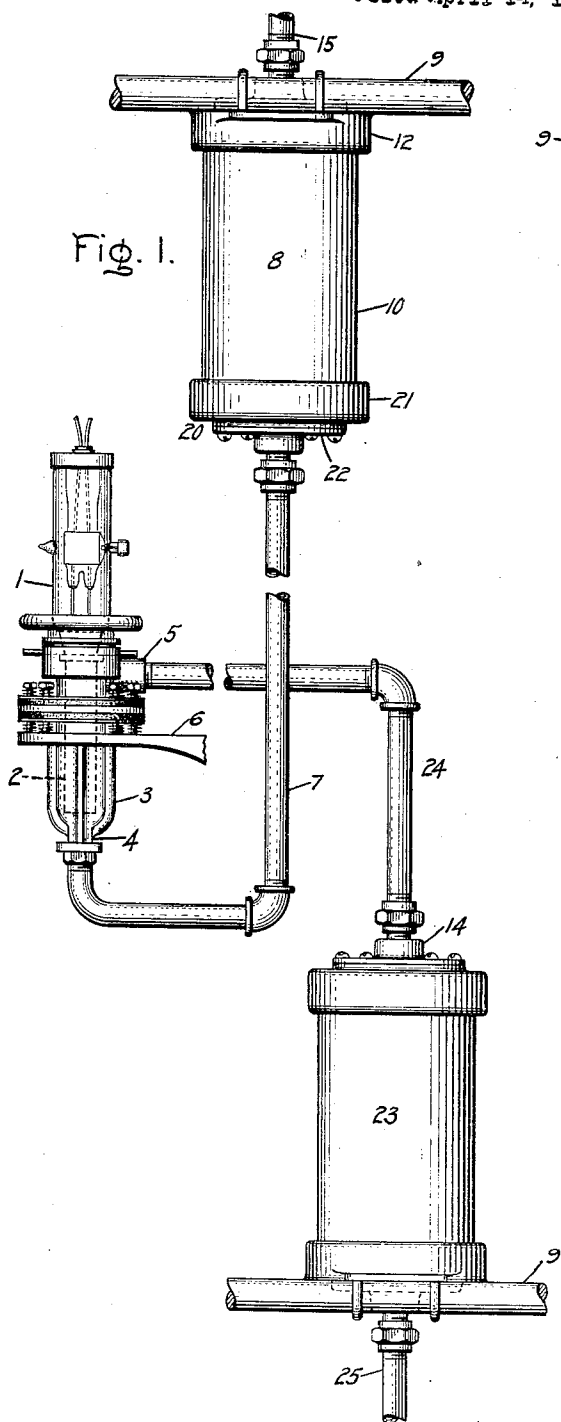
Jan. 3, 1928.

1,655,262

P. R. FORTIN

WATER SPRAY INSULATOR

Filed April 14, 1926



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UNITED STATES PATENT OFFICE.

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WATER-SPRAY INSULATOR.

Application filed April 14, 1926. Serial No. 102,053.

My present invention relates to cooling systems employed in connection with space current devices of the power type, and more particularly to the use of a high resistance unit in the cooling system.

In one form of cooling device for power tubes, rubber hose is connected to the upper and lower portions of the water jacket of the tube, and water is allowed to flow there-through. This type of cooling means is not entirely satisfactory when very high voltages are employed, due to the fact that the water column cannot be made long enough to provide a sufficiently high electrical resistance to prevent flow of electric current at the operating voltages of the tube. Owing to the flow of current through the hose, electrolysis of the tube water jacket takes place, also a deposit accumulates on the inner wall of the hose which gradually cuts down the resistance of the water column. In addition to this, corona causes pin hole punctures and leaks in the hose and rapidly hardens it.

It is one of the objects of my invention to provide in a water cooling system for electrical discharge devices, an insulator which substantially prevents the flow of current through the cooling system, which is simple in construction, durable and effective in operation.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation will best be understood from reference to the following description taken in connection with the accompanying drawing in which Fig. 1 shows in elevation a cooling system for a power tube, which involves the features of my invention; Fig. 2 is a view partly in section and partly in elevation of the insulator; while Fig. 3 is a perspective view of the perforated plate of the insulator.

Referring to the drawing, I have indicated at 1 an electrical apparatus which may be a space current device of the power type having an anode 2 which normally operates at a relatively high voltage above ground. The anode is provided with a water jacket 3 having an inlet 4 and an outlet 5 for the circulation of cooling fluid. The discharge device is mounted on a platform or plate 6 and is adapted to be connected through a

pipe system 7 to a high resistance element, in the present instance, a spray insulator unit 8 which may be supported on rigid bars 9 or in any suitable manner desired.

Spray insulator 8 comprises a cylindrical body 10 which may be made of pyrex glass, or other suitable material. The upper end of the cylindrical body is provided with a metal closure member 11 comprising a flanged metal ring 12 cemented to the glass body 10, and a plate 13 bolted to the ring 12 and provided with a central screw threaded opening or nozzle 14 to which a water supply pipe 15 may be connected. Between the flanged ring 12 and plate 13, a perforated plate 16 is clamped. A circular baffle plate 17 which serves to prevent the flaring out of the water column is rigidly mounted on the plate 16 beneath opening or nozzle 14. The baffle plate is spaced from plate 16 by means of a washer 18 and extends toward a series of openings 19 arranged circumferentially around the outer edge of plate 16 as indicated in Fig. 3. Each opening 19 is relatively small and in the present case is substantially one-quarter inch in diameter, the total area of the opening being at least equal to or slightly greater than the opening or nozzle 14. As thus arranged, when cooling fluid is supplied through pipe 15 at a rate not greater than about five gallons per minute, the water column is broken up into drops which will provide a series of air gaps, the sum of which will equal approximately one-half the length of the cylindrical body 10 and thus supply a sufficient air gap to prevent the flow of any appreciable current at the operating voltage of the anode. The lower end of cylinder 10 is provided with a closure member 20 comprising a flanged ring 21 cemented to the cylinder 10 and a centrally perforated plate 22 bolted to the ring 21.

A second spray insulator 23 similar to insulator 8 is connected to the outlet opening 5 of the discharge device 1 by means of a pipe connection 24, and a drain pipe 25 is connected to the lower end of the insulator 23. The electrical resistance between the nozzle 14 of each spray resistor and the normal level of water therein may be designed for any value and is normally so high that a milliammeter included in circuit therewith will fail to produce any indication of current flow at the operating voltage

of the discharge device. As a result, when the power tube is in operation and normal operating voltage applied to the anode, substantially no flow of current occurs through the cooling water column.

By the provision of the circular openings of the size indicated, in the plate, a satisfactory diameter of spray is obtained, a constant flow of water is maintained without the employment of excessive pressure and the possibility of obstruction of the openings is greatly diminished.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a cooling system for an electric device, a container having inlet and outlet openings for the circulation of a cooling fluid, a plurality of spray insulators, one of said insulators being connected to the inlet opening of the container and the other insulator to the outlet opening thereof, each of said insulators comprising a hollow insulating member provided with end caps having openings therethrough, and a perforated plate adjacent the inlet of each insulator whereby the cooling liquid column may be broken into a series of drops.

2. An electric discharge device having an electrode normally operating at relatively high voltages above ground, means for circulating a cooling fluid in contact with said electrode, said means including a spray insulator, said insulator comprising a hollow insulating member provided with a plate having a series of openings therein, said plate being mounted adjacent one end of said hollow member.

3. In a cooling system for an electric discharge device having an electrode in contact with the cooling fluid and normally operating at a relatively high voltage above ground, a spray insulator comprising a hollow insulating member provided with a perforated closure means at one end thereof and a perforated plate mounted within said insulator and adjacent one end of the hollow member, the resistance of said spray insulator being sufficiently high to substantially prevent flow of current through the insulator at the operating voltage of said electrode.

4. In combination, an electric device, a container having inlet and outlet openings for the circulation of cooling fluid, a spray insulator comprising a receptacle having inlet and outlet openings, a connection between the outlet opening of the insulator

and the inlet opening of the container, a second spray insulator having inlet and outlet openings, and a connection between the outlet opening of the container and the inlet opening of the second insulator, and means within each insulator for breaking the fluid stream into drops to thereby provide a series of air gaps.

5. In a fluid cooling system for electric discharge devices, a spray insulator unit, said unit comprising a hollow receptacle of insulating material having inlet and outlet openings, and means within said receptacle for breaking a fluid column into drops to thereby provide a series of air gaps of sufficient resistance to prevent the flow of current through said insulator at the operating voltage of said discharge device.

6. A liquid spray insulator comprising a hollow insulating member, a cap on each end of the member, each cap having a central opening therethrough, a plate mounted within said hollow member, said plate being provided with a series of openings out of alignment with the central opening and substantially equal in area to the area of said central opening.

7. In combination, a spray insulator comprising a hollow body of insulating material, closure members at each end of said body, said body having inlet and outlet openings adjacent each end thereof, and a perforated plate mounted adjacent the inlet opening and provided with a series of openings having a combined area not less than the area of the inlet opening.

8. In combination, a spray insulator comprising a substantially cylindrical body of insulating material, closure members at each end of said body, each of said closure members having an opening to permit the flow of cooling fluid through the insulator, and a perforated plate mounted adjacent one of said closure members and adapted to break the fluid stream supplied to the insulator into drops and thereby provide a series of air gaps in the liquid column.

9. In combination, a liquid spray insulator having an inlet opening, a perforated plate mounted adjacent said opening, and a deflector plate mounted between said inlet opening and said perforated plate.

In witness whereof, I have hereunto set my hand this 13th day of April, 1926.

PAUL R. FORTIN.