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MEANS FOR COOLING THERMIONIC VALVES

Filed Oct. 28, 1924

Fig. 1

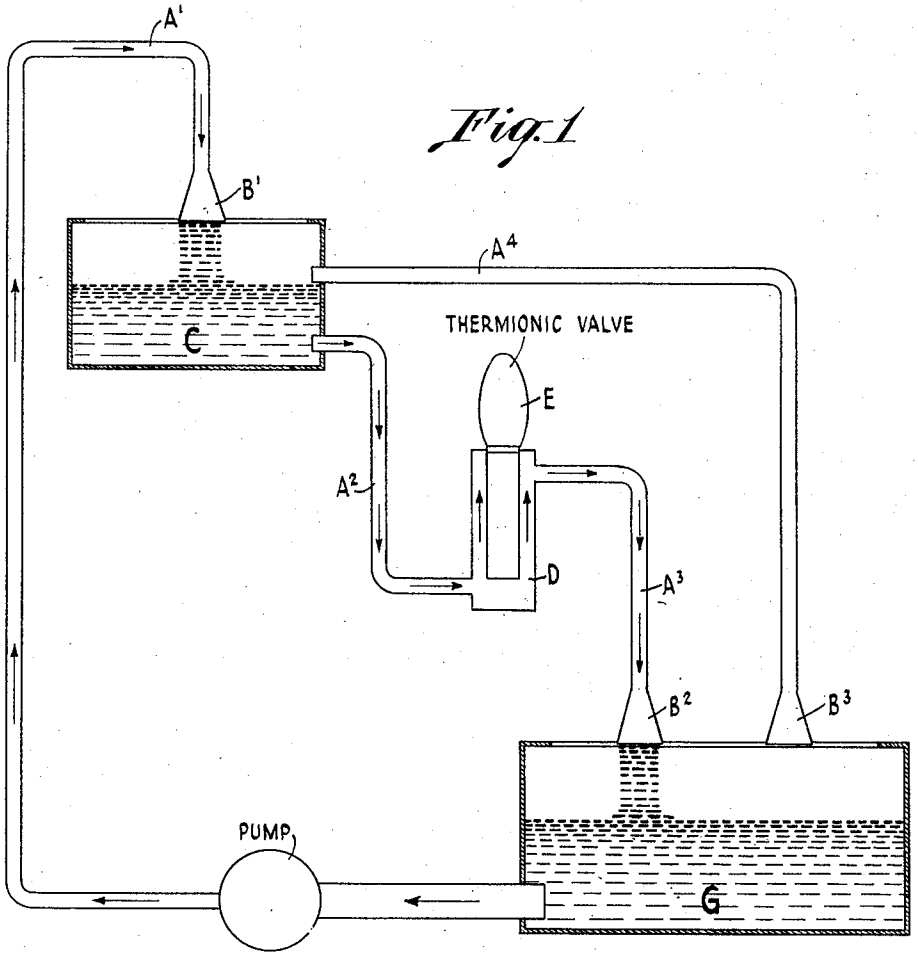
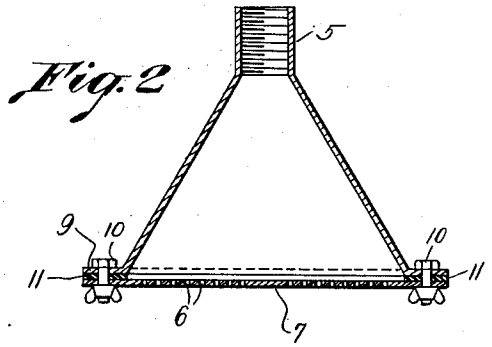


Fig. 2



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MEANS FOR COOLING THERMIONIC VALVES

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This invention has for its object to provide improved means for enabling the anode of a thermionic valve to be cooled by a semi-conducting liquid, such as water, without leakage of current and consequent loss of energy through the cooling liquid.

It has previously been proposed to conduct the cooling water through long pipes of insulating material, so that the leakage through the water to earth may be comparatively small.

It has, however, been found in practice that even using pipes of some forty feet in length the power lost at voltages of about ten thousand or over is a serious factor with ordinary fresh water, while the use of sea water would be out of the question.

According to the present invention I insert in both the supply to and the exhaust from each valve jacket or bank of valves a spraying rose or some equivalent means of breaking up the liquid into small globules, and an air space through which the spray travels. I find that this arrangement renders the liquid column of practically infinite resistance and the leakage is reduced to zero.

The invention is illustrated in the accompanying drawing, wherein Fig. 1 represents a schematic arrangement of my cooling system, and Fig. 2 represents a vertical cross section through one of the roses.

A1 is the supply pipe through which water is conducted to a rose B1 from which water falls in a spray into a tank C from the bottom of which a pipe A2 leads it to the bottom of a container D holding the thermionic valve E. The water rises up through this container and flows through the pipe A3 to a second rose B2 from which the water falls in a spray into an exhaust tank G. A4 is an overflow pipe leading from the tank C to a rose B3 so that should the amount of water delivered to tank C be in excess of that which can flow through the container, as soon as the level in tank C rises to the mouth of the overflow pipe A4 the excess water will pass through this pipe to the exhaust tank G.

It will be understood that even though the supply pipe A1 and the exhaust tank G are at earth potential, tank C, the pipes A2, A3, A4, and the container D may be at a high potential without any leakage occurring owing to the interruption at the roses.

It has been found that with roses having holes $\frac{1}{32}$ of an inch in diameter and arranged three inches above the water level in the tanks, the water system was of infinite resistance even when the container had a potential of 12,000 volts.

Fig. 2 shows more clearly the construction of the rose. Portion 5 is connected by screw threads or otherwise to the pipe A1, A3, or A4. The cooling fluid is forced out through the apertures 6 in the bottom plate 7 of the rose. The plate 7 is secured to the flange portion 9 of the rose by means of the bolts 10, and a gasket 11 of rubber or other water-proof material is interposed between the flange 9 and the bottom plate 7. The rose may be square or round in shape, or may have any other form that is found desirable.

Having described my invention what I claim is:—

1. The combination of an electrical device having a portion heated during use, with a system containing a semi-electrically conducting fluid for cooling said heated portion, said system comprising a jacket surrounding said heated portion, a spray and storage means for supplying the cooling fluid to said jacket, a second spray and storage means for receiving said cooling fluid from said jacket, and a by-pass for passing any excess of cooling fluid from the first mentioned spray and storage means to the second mentioned spray and storage means.

2. In combination, a space current device having a metallic electrode comprising a portion of the shell thereof, and a cooling system, combined therewith, comprising a fluid jacket

surrounding said metal shell portion, supply and exhaust conduits connected thereto, means cooperating with said supply and exhaust conduits for breaking up the fluid stream into globules separated by air spaces, and means for preventing the cooling fluid from rendering a portion of said cooperating means inoperative, whereby said metal shell portion is maintained electrically insulated from other portions of said cooling system.

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