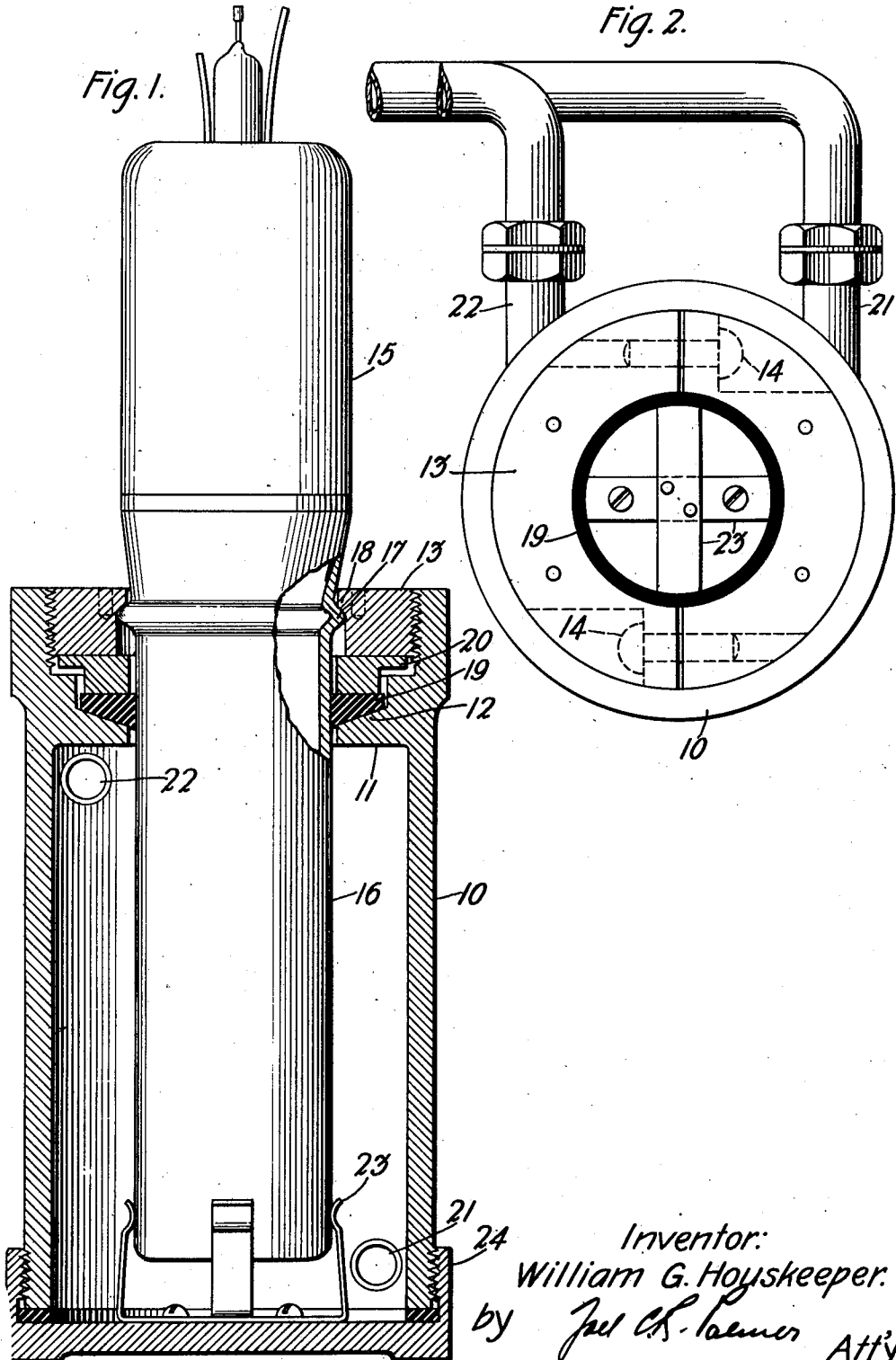


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W. G. HOUSKEEPER
ELECTRON DISCHARGE DEVICE

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UNITED STATES PATENT OFFICE.

WILLIAM G. HOUSKEEPER, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRON-DISCHARGE DEVICE.

Application filed June 9, 1922. Serial No. 566,973.

To all whom it may concern:

Be it known that I, WILLIAM G. HOUSKEEPER, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Electron-Discharge Devices, of which the following is a full, clear, concise, and exact description.

10 This invention relates to cooling systems for electron discharge devices of the type in which the anode forms a portion of the containing vessel.

In order to remove from the anode of a device of this type, heat generated therein during the operation of the device, it is customary to arrange the anode within a vessel through which is circulated a cooling medium such, for example, as water. 15 Because of the evacuated condition of the device, it is extremely buoyant and has to be firmly held down in order to retain the anode in the cooling medium; also, as it is customary to supply the cooling fluid under considerable pressure, it is desirable that there be a fluid-tight connection between the anode of the device and the vessel containing the cooling medium. Since there is a great deal of heat generated in the anodes of the tubes of this character, it is essential that no air bubbles be allowed to collect on the anode, even momentarily, in order to prevent the possibility of local overheating and failure of the anode at the place of 35 overheating.

It is an object of this invention to maintain securely the anode of an electron discharge device of the above noted character in a water jacket and to establish a fluid-tight connection between the anode and the 40 jacket.

Another object of the invention is to introduce the current of cooling medium into the water jacket in such a manner that 45 its contact with the anode is always in motion in a definite direction.

Other objects and novel features of the invention will be apparent from the following description and accompanying drawing, wherein Fig. 1 is a vertical section through the water jacket with an electron discharge device in place, and Fig. 2 is a plan view of the water jacket.

55 The water jacket 10 consists of a substantially cylindrical casting near the upper end

of which is arranged an inwardly projecting annular flange 11, the surface 12 of which slopes downwardly towards the axis of the casting. The upper end of the casting is screw-threaded to receive the collar 60 13 which is composed of two similar portions held together by means of the screws 14.

The electron discharge device 15 comprises a metallic cup-shaped portion 16 which 65 serves as the anode of the device. The open end of the anode 16 is flared outwardly and fused to the glass portion of the device. Just below the flared portion of the anode is provided an outwardly rolled projection 70 17 which is adapted to be engaged by the inwardly projecting shoulder 18 on the collar 13.

To position the anode within the water jacket 10, the screws 14 are loosened and 75 the collar 13 is arranged with its shoulder 18 intermediate the projection 17 on the anode and the flared end of the anode and the screws 14 tightened. The collar 13 is then screwed into the open end of the casting and the device is suspended in the casting by virtue of the engagement of the shoulder 18 with the flared end of the anode. In order to establish a water tight connection between the anode and the casting, 85 there is provided an annular gasket 19, preferably of rubber, having its lower surface tapered to conform to the surface 12. A metallic washer 20 is interposed between the upper surface of the gasket 19 and the lower 90 surface of the collar 13. Thus, when the collar 13 is screwed into the casting the gasket 19 is compressed and forced radially inward against the anode whereby a fluid tight connection is established. 95

A cooling fluid is supplied to and removed from the water jacket through the inlet and outlet ports 21 and 22 which are arranged substantially tangentially of the anode 16. The cooling fluid is supplied to 100 the water jacket under considerable pressure and the tangential arrangement of the inlet and outlet ports so directs the current of cooling medium that it flows helically around the anode 16, thereby insuring the 105 constant motion of the water in contact with the anode and the consequent prevention of accumulation of bubbles of air on the anode.

The device is firmly maintained in the water jacket against the buoyancy of the 110

device by the engagement of the projection 17 with the shoulder 18 of the collar 13, and the free end of the anode is held centrally in the water jacket by the spring clips 23 arranged on the cap 24 which closes the bottom of the casting.

What is claimed is:

1. In combination, an electron discharge device having a cylindrical metal portion with a circumferential ridge, a jacket therefor comprising a cup-shaped receptacle having an inwardly projecting sloping flange adjacent its open end, a gasket resting on said flange and a collar threaded in the end of said receptacle and exerting pressure on said gasket to form a fluid-tight joint between said flange and said metal portion, said collar having an inwardly projecting annular shoulder in contact with said circumferential ridge to prevent outward movement of said metal portion.

2. In combination, an electron discharge device having a cylindrical metal portion with a circumferential ridge, a jacket therefor comprising a cup-shaped receptacle, an inwardly projecting flange adjacent the open end of said receptacle, a resilient member in contact with said flange and said metal portion, a threaded collar engaging said ridge and said receptacle, and means interposed between said resilient member and said collar, whereby the pressure of said collar forces the resilient member between said flange and said metal portion to provide a water-tight joint.

3. In a cooling system for a high potential electron discharge device, a cup-shaped water-jacket having inlet and outlet ports

at its bottom and top, respectively, said ports being directed substantially tangentially in the inner surface of the water-jacket in opposite directions, an anode projecting into said water-jacket, and a water supply feeding said inlet port.

4. In combination, an electron discharge device having a cylindrical metal portion with a circumferential ridge, a jacket therefor comprising a cup-shaped receptacle, an inwardly projecting flange adjacent the open end of said receptacle, a resilient member in contact with said flange and said metal portion, an apertured split closure surrounding and engaging said ridge, an annular ring interposed between said resilient member and said closure, whereby the pressure of said closure forces the resilient member between the flange and the metal portion to provide a water-tight joint.

5. In combination, a vessel having an inwardly projecting flange, an electron discharge device arranged within said vessel, said device comprising a metallic cup-shaped anode having a flared end, an annular projection on said anode adjacent said flared end, a two part collar having an inwardly projecting shoulder arranged between said projection and said flared end, a screw threaded connection between said vessel and said collar, a gasket interposed between said collar and said flange, and means for circulating a cooling medium helically around said anode.

In witness whereof, I hereunto subscribe my name this 7th day of June A. D., 1922.

WILLIAM G. HOUSKEEPER.