Nov. 17, 1925. 1,562,403

J. R. WILSON

ELECTRON DISCHARGE DEVICE

Filed Dec. 19, 1924

Fig. 1

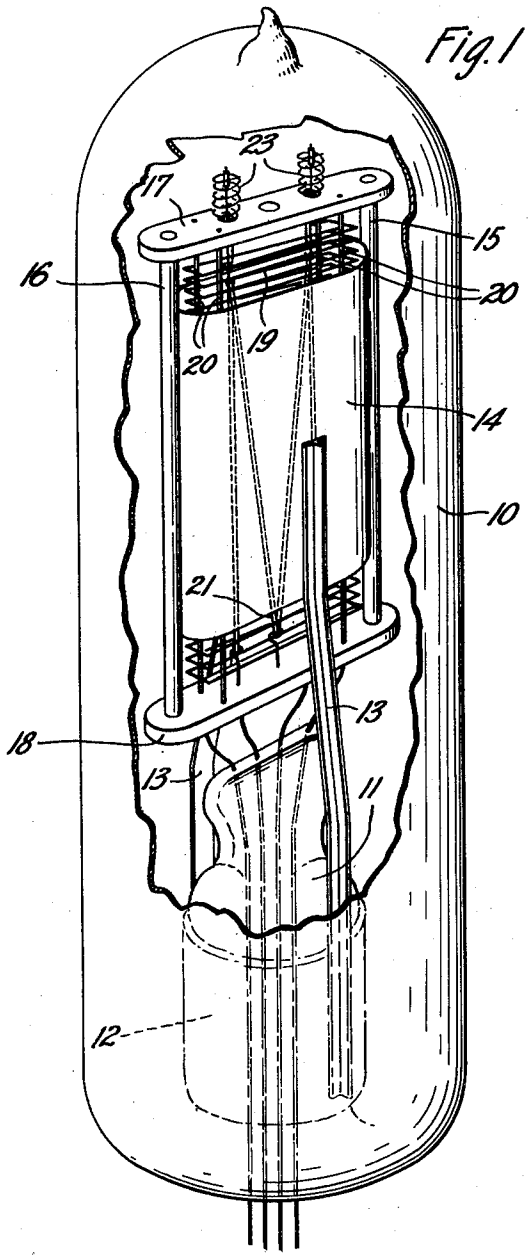


Fig. 2

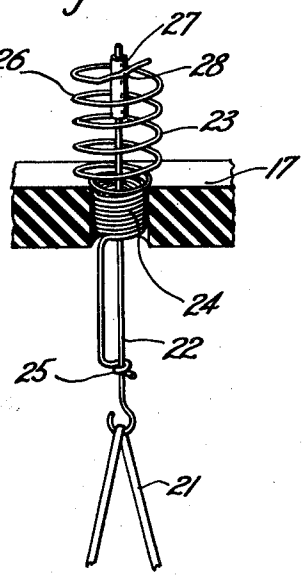
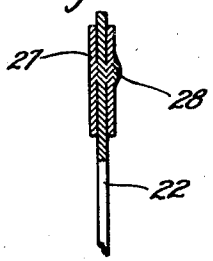


Fig. 3



Inventor;
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by [signature] Atty

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UNITED STATES PATENT OFFICE.

JAMES R. WILSON, 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 December 19, 1924. Serial No. 756,859.

To all whom it may concern:

Be it known that I, JAMES R. WILSON, a citizen of the United States of America, residing at New York, in the county of New York and 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.

This invention relates to electron discharge devices and has for an object an improved tensioning support for the cathode of high power vacuum tubes.

This object is attained by providing a resilient member which retains its resiliency at the operating temperatures of high power electron discharge devices, and supporting the cathode therefrom by means of a suspension member of a highly refractory metal capable of withstanding the temperature at which the cathode operates. Monel metal is used as the resilient member and molybdenum as the suspension member. Since it is not possible to secure a satisfactory weld between these metals directly, it is proposed to arrange a metallic sleeve, having a melting point intermediate that of "monel" and molybdenum, on one of said members and welding the members to the metallic sleeve simultaneously. This arrangement provides an easily assembled structure in which the dissimilar metals are joined together at a single point without affecting the lower melting point resilient spring.

Referring now to the drawings

Fig 1 illustrates an electron discharge device employing this invention.

Fig. 2 is an enlarged detailed view of the resilient cathode support and

Fig. 3 is an enlarged view in cross section of the welded joint.

The electron discharge device comprises a glass enclosing vessel 10 having an inwardly projecting stem 11. A metallic collar 12 is frictionally held on the stem and carries upright arms 13, of T-shaped cross-section. The upper end of each arm 13 is welded to a surface of a flattened cylindrical anode 14. A pair of rods 15 and 16 are attached to the anode and support insulating members 17 and 18 at the upper and lower ends thereof. A helical control electrode or grid 19, having supporting rods 20, is supported within the anode 14, the rods 20 being inserted in apertures in the insulating members 17 and 18. A cathode 21 is arranged within the grid 19 and attached to hooks in the member 18. The cathode 21 is held under tension at the upper ends by means of resiliently supported hooks 22. The direct contact between the cathode 21 and the hooks 22 necessitates the use of a highly refractory, high melting point metal. Molybdenum has been found to be satisfactory for this purpose as it is sufficiently ductile so that it may be formed into a hook. A resilient support 23 surrounds the hook 22 and it is formed of a metal which is capable of retaining its high resilient characteristics under high temperature conditions. Monel metal is preferably used for the resilient spring; however, its melting point is lower than molybdenum. The "monel" resilient support consists of a closely wound wire helix 24 which fits into an aperture in the member 17, one end of the wire being bent to form a guide portion 25 extending from one side of the member toward the member 18, and the other end of the wire being formed into an open helix 26 situated on the other side of the member 17. The free end of the helix 26 is bent so that it bridges the open helix. A thin metallic sleeve 27, of a metal or alloy having a melting point intermediate to that of "monel" and molybdenum is positioned on the shank end of the hook 22. Preferably, this sleeve is of nickel, since it can be more easily formed and is low in cost. This sleeve may be formed so that there is a sliding fit on the hook or it may be clamped to the shank of the hook. The hook 22 is held within the resilient spring 23 so that the metallic sleeve 27 is adjacent the bridging end of the helix 26. The point of crossing of the spring and sleeve is then spot-welded, so that the nickel sleeve, hook and spring are fused together. The nickel sleeve affords an easy means of compensating for the differences of melting points between the resilient member and suspension member so that it is possible to weld these dissimilar metals without causing the deterioration of the lower melting point resilient spring.

What is claimed is:

1. In an electron discharge device, a

cathode, a highly refractory supporting wire engaging said cathode, a helix composed of a wire resilient at high temperatures, and a metallic sleeve surrounding one of said wires, said sleeve, supporting wire and helix being welded together at a single point.

2. In an electron discharge device, a cathode, a suspension member of high melting point metal engaging said cathode, a resilient member of a lower melting point metal surrounding said hook, and a metallic sleeve on one of said members, said metal sleeve having a melting point intermediate of that of the other members and being welded to both of said other members.

3. In an electron discharge device, a cathode, a resilient helix of Monel metal, a molybdenum hook passing through said helix and supporting said cathode, and a different metal member surrounding one end of said hook, said member being welded both to said hook and said helix.

4. In an electron discharge device, a cathode, a resilient helix of Monel metal, a molybdenum supporting hook passing through said helix and supporting said cathode, and a nickel sleeve on said hook, said sleeve being welded to said hook and one end of said resilient helix simultaneously.

5. In an electron discharge device, a "monel" wire helical member, a molybdenum suspension member centrally positioned within said helical member, a nickel sleeve on one of said members, said sleeve being welded to said helical member and said suspension member at a single point, and a cathode supported by said member.

In witness whereof, I hereunto subscribe my name this 17th day of December A. D., 1924.

JAMES R. WILSON.