Aug. 30, 1932. H. J. ROUND 1,874,355

THERMIONIC VALVE

Filed March 10, 1925

Fig. 1

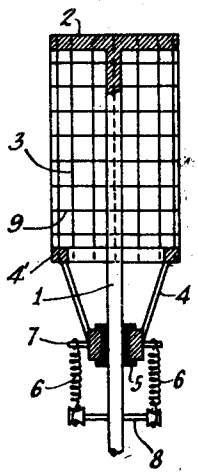

Fig. 2

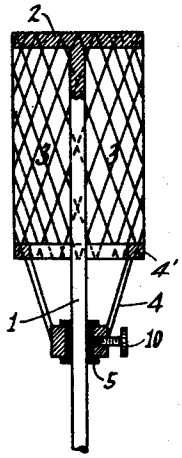

Fig. 3

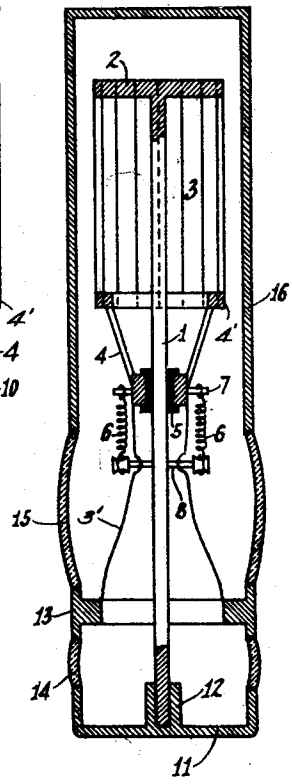

Fig. 4

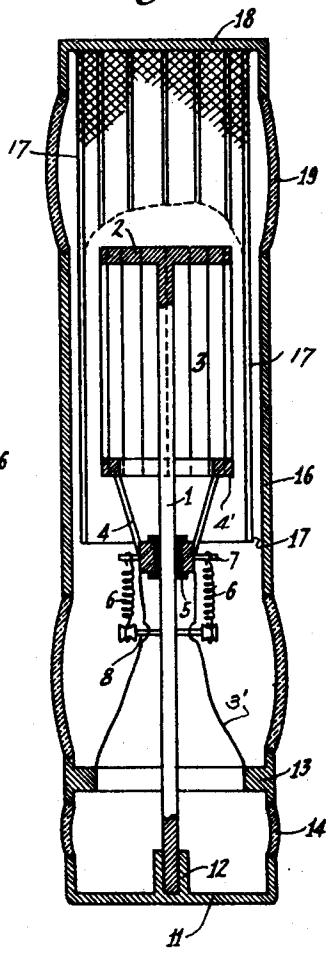

Fig. 5

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UNITED STATES PATENT OFFICE

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THERMIONIC VALVE

Application filed March 10, 1925, Serial No. 14,567, and in Great Britain March 10, 1924.

This invention relates to thermionic valves.

When a valve is used either for rectifying or for generating oscillations it is usually desirable that it should have a large current carrying capacity and low resistance. The first requisite can be obtained by employing a large filament; the second by arranging the filament as close as possible to the anode or grid. A long filament, however is weak laterally and is apt to be deformed under the strong attraction from the anode. To overcome this defect it has been suggested to employ a number of filaments in parallel but if this is done the magnetic forces between the filaments cause trouble.

According to this invention I construct the cathode of a cylinder of parallel wires or meshwork which is supported at one end by a disk carried by a stem lying along the axis of the cylinder and at the other end by a movable support which may conveniently comprise a ring carried by a spider the centre of which can slide along the stem, an insulating sleeve or bush being interposed between the spider and the stem.

Means may be provided for keeping the meshwork taut, for instance, I may connect the spider by springs to the stem through an insulator.

Preferably the stem is supported on a plate or cap fused on to the end of a short glass cylinder or ring of metal which is mounted on a long glass cylinder, and this again in turn is fused on to the anode. The short ring of metal is connected by flexible metal to the ring surrounding the stem.

This plate or cap and the short metal ring act as the input terminals for the filament current.

Thus two connections to the cathode come to the outside.

In a valve in which there is a grid the other end of the anode is fused on to a glass cylinder, which is fused on to a metal plate or cap on which the grid is mounted.

The invention is illustrated in the accompanying drawing, in which

Fig. 1 shows a cathode in accordance with this invention;

Fig. 2 shows a modified form of cathode;

Fig. 3 illustrates the invention as applied to a rectifying valve;

Fig. 4 illustrates the invention as applied to an amplifying valve; and

Fig. 5 shows a detail.

Referring to Fig. 1, 1 is a central stem supporting a metal disk 2 to which one end of the wires 3 forming the cathode is secured, the other end of the wires being attached to a metal ring 4′ integral with an electrically conducting spider 4, slidably mounted on the stem 1, also electrically conducting. 5 is a sleeve of insulating material interposed between the spider 4 and stem 1. The wires 3 are kept taut by springs 6 attached at one end to lugs 7 on the spider and at the other end to an insulator on a pin 8 passing through the stem 1. Spacing wires 9 may be provided which intermesh with the wires 3.

Referring to Fig. 2, similar parts have similar numerals. In this case the wires 3 form a portion of a helix and are intermeshed, while the spider 4 is maintained in such a position on the stem 1 by a screw 10 that the wires 3 lie on a cylindrical surface; on becoming heated, the curvature of the wires 3 is altered to a slight extent only.

Referring to Fig. 3, which shows a rectifying valve, similar parts have similar numerals. 11 is a cap provided with a socket 12 for receiving the stem 1; 13 is a metal ring to which the wires 3 are electrically connected as shown at 3′ and which is fused to glass cylinders 14 and 15 of which 14 is also fused to the cap 11, and 15 to a cylindrical metal anode 16 whose other end is closed.

Fig. 4 shows an amplifying valve having a grid 17 secured to a metal cap 18; 19 is a glass cylinder secured at one end to the cap 18 and at the other end to the anode 16.

Fig. 5 shows a modified form of seal between the cap 11 and the metal ring 13. Since the insulation 14 between the cap and ring has only to withstand the small potential difference due to the filament voltage, it may be quite small and be formed of a glass ring, the cap 11 and metal ring 13 terminating in thin metal rims, say of platinum.

Having described my invention what I claim is:

1. A thermionic device, comprising an evacuated envelope, a metallic cap closing one end thereof, a cathode comprising a metallic rod supported by said cap, a disk fixed to one end of said rod, a metallic ring slidably mounted on said rod and insulated therefrom, a filament comprising a plurality of wires connected between said disk and said ring, and means connected with said metallic ring for applying tension to the filament wires, an anode surrounding said cathode, a metallic contact member forming a portion of said envelope, insulating means between said metallic contact member and said metallic cap, and conducting means, connecting said metallic ring and said contact member.

2. In a thermionic device, the combination with an evacuated tubular envelope having walls consisting of a tubular metal anode with a glass ring hermetically sealed to each of its ends, a metal cap hermetically sealed to one of said glass rings, a metal contact ring hermetically sealed at one edge to the other of said glass rings, a third glass ring adjoining and sealed to the other edge of said metal contact ring, and a second metal cap hermetically sealed to said third glass ring, of a tubular grid mounted on said first metal cap to project into said envelope inside of and concentric with said anode, a cathode comprising a central metal rod mounted on and projecting from said second metal cap into said envelope concentric with said anode, a circular metal disc mounted on and extending transversely of said rod near one end, a metal spider slidably mounted on and insulated from said rod near the end and comprising a metal ring encircling said rod, a plurality of filaments stretched side by side from the rim of said disc to the metal ring on said spider along a cylindrical surface inside of and concentric with said grid, and an electrical connection between said spider and said metal contact ring in the wall of said envelope.

3. A thermionic cathode comprising a metal rod, a transverse metal disc fixed to said rod near one end, a metal spider having arms projecting from a hub insulated from and slidably mounted on said rod near the other end thereof, a plurality of electron emitting filaments each secured at one end to the rim of said disc and at the other end to said spider, and a resilient member engaging said rod and said spider to move said spider along said rod away from said disc to stretch said filaments between said disc and said spider.

4. A thermionic cathode comprising a metal rod, a transverse metal disc fixed to said rod near one end, an insulating stud on said rod near the other end, a metal spider on said rod between said disc and said stud and comprising a metal ring on the ends of arms projecting from a hub, an insulating bushing fixed in said hub and slidable along said rod, a plurality of filaments stretched side by side between the rim of said disc and said metal ring, and a tension spring anchored at one end to said stud and at the other end to said spider to pull said spider away from said disc and maintain said filaments taut.

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