June 2, 1931. W. WEINGARTNER 1,807,885

FILAMENT MOUNTING

Filed Aug. 31, 1929

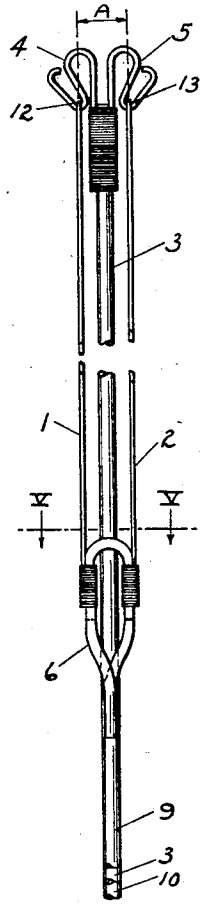


Fig. 1.

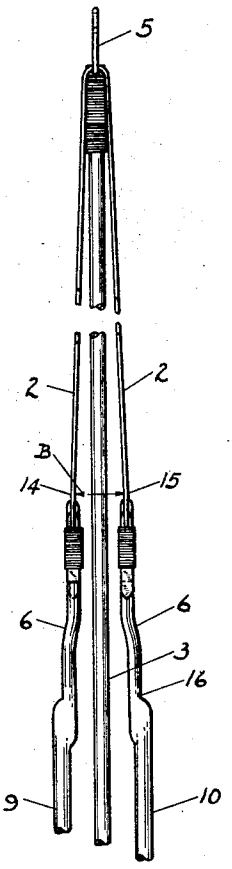


Fig. 2.

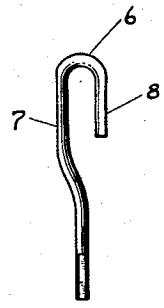


Fig. 3.

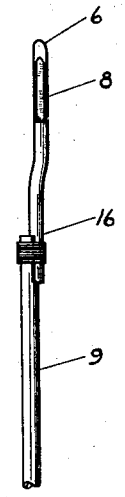
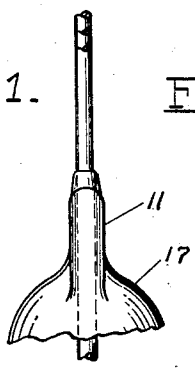
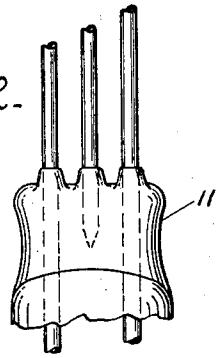
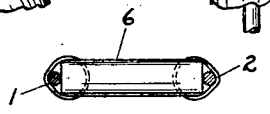


Fig. 4.







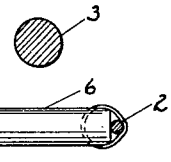


Fig. 5.

INVENTOR
W. WEINGARTNER
BY
ATTORNEY

Patented June 2, 1931 1,807,885

UNITED STATES PATENT OFFICE

WILLIAM WEINGARTNER, OF IRVINGTON, NEW JERSEY, ASSIGNOR TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA

FILAMENT MOUNTING

Application filed August 31, 1929. Serial No. 389,697.

This invention relates to incandescent lamps, electron discharge devices, gas discharge devices and the like electrical devices employing an incandescent filament and more particularly relates to the method of mounting said filament in said devices, and has for its object the provision of a method of mounting and supporting the filament in a substantially strain free position, so that subsequent distortion during operating life is substantially eliminated.

Another object of this invention is to provide a means of obtaining uniformity in filament spacing and alignment in devices such as electron discharge devices, wherein the incandescent filament is employed as an electron emitting cathode in cooperation with one or more associated electrodes.

Another object of the present invention is to facilitate the manufacture and assembly of electric devices employing an incandescent filament.

Other objects and advantages will become apparent as the invention is more fully disclosed.

In accordance with the objects of my invention I have found that a large proportion of the deleterious distortion of a metal filament mounted in accordance with prior art practices has been due to the mechanical stresses and strains applied to the filament during the mounting operation, which tend to distort the filament from its preformed condition.

It is customary in the manufacture of electric devices such as incandescent lamps, electron discharge devices and the like employing segmented type filaments, particularly filaments of the tungsten class, to preform the said segmented filament. Subsequently the preformed V, W or M shaped filament is mounted within the device.

During such mounting the legs of the filament are attached to the filament support members at the desired points, with little regard to the pre-formed spacings imparted thereto, with a consequence that mechanical stresses and strains are set up in the filament. With filaments of the tungsten class wherein the elongated cold worked grains of the filament are subjected to recrystallization upon incandescence, the rate of said recrystallization and the direction of grain growth is materially effected by the application of mechanical stresses or strains. As a result of grain recrystallization while under strain the filament becomes displaced from its mounted position. Such phenomena is usually spoken of as sag, twist and the like terms.

In electron discharge devices such as radio tubes, power tubes, rectifier tubes and the like devices, displacement of the incandescent filamentary cathode alters the spacing of the cathode from the cooperating electrodes of the device, thus causing variations in the electrical characteristics of the device. It is highly essential that in such devices this alteration of cathode spacing and alignment during assembly, manufacture and use be reduced to the minimum.

Before further disclosing the nature of my invention reference should be had to the accompanying drawings wherein is shown in

Fig. 1 a front elevational fragmentary view of a filament mounted in accordance with the present invention.

Fig. 2 is a side elevational view of the same.

Fig. 3 is a front elevational view of the device I employ in the mounting of filaments to obtain definite strain free spacing therein; and

Fig. 4 is a side elevational view of the filament spacing member shown in Fig. 3, showing the manner in which it is connected to the leading in support wire.

Fig. 5 is an enlarged cross-sectional view taken along line V—V in Fig. 1.

The filament mount shown in Fig. 1 is typical of the type employed in an electron discharge device known to the trade as a UV 854 which is a 10 kilowatt, water cooled power oscillator tube. In such a type tube the spacing of the cooperating electrodes is very close and any displacement in the alignment of the cathode materially alters the plate current of the device.

It is customary in such a device to employ two inverted V shaped filaments 1 and 2 connected electrically in parallel with a central

support member 3 having tensional spring members 4 and 5 at the top engaging the V of the filament.

Heretofore it has been exceedingly difficult to mount these filaments so that they are substantially vertically parallel, and parallel also to the central support member 3. It has also been difficult to obtain such a mounting of the two inverted V shaped filaments so that no mechanical stress or strain is imparted thereto.

I effect this in the following novel manner by providing an inverted U shaped filament support member 6 such as is shown in Fig. 3, which is comprised preferably of molybdenum as this highly refractory metal in the sizes employed may be more readily shaped and subsequently welded to the filament than may tungsten. The outer parallel edges 7 and 8 of the U are ground off or otherwise flattened.

The leg 16 of the U shaped support member is then connected to the leading-in support wires 9 and 10 passing through the press 11 of the reentrant portion 17 of a flare tube not shown, in any convenient manner such as is shown in Fig. 4, which consists in flattening the two adjoining surfaces of the U shaped support wire and of the leading-in wire in such manner as to form a shoulder for the leg of the support member to rest upon, tightly wrapping the two together with molybdenum wire, and then arc welding the union together.

The two U connectors are mounted upon the leading in filament support wires in such manner as to present parallel edges and they may then be adjusted so as to be equidistant from the center support wire 3 at a distance approximately equal to the inside distance between the two legs of the preformed inverted V shaped filaments 1 and 2 and in a vertical plane parallel to the upper spring support suspension members 4 and 5. This position places the flattened edges 7 and 8 of the U connector in such position that one leg of filament 1 and one leg of filament 2 fall adjacent the flattened surfaces 7 and 8 of the said U support member when the filaments are vertically suspended from spring suspension members 4 and 5.

By making the distance between the two flattened surfaces of the U connector approximately equal to the distance "A" between points 12 and 13 (Fig. 1) on spring suspension members 4 and 5 when said filaments 1 and 2 are vertically suspended therefrom, the aligning of the filament legs in a substantially vertical position and in parallel relationship to each other is a matter of relative simplicity.

In this method of filament mounting the deleterious effects due to mounting stresses and strains imparted to the filament through mechanical displacement of the filament legs from their preformed positions, is substantially eliminated as may be noted in Fig. 2, wherein is shown how the U connectors 6 and 6 have been adjusted so that the distance therebetween is substantially equal to the distance "B" between points 14 and 15 (Fig. 2) on the two legs of the filament 2, when the filament is vertically suspended from the support suspension member 5. In Fig. 5 is shown a cross-sectional view of the mount in Fig. 1 taken on plane V—V wherein may be discerned the spacing of the elements.

When the elements have been properly adjusted the legs of the filaments 1 and 2 are electrically connected to the surfaces of the U connector in any desired manner such as by arc welding and the assembled mount is ready to be incorporated in an electron discharge device.

It is apparent that there may be many variations and departures from the specific embodiment herein disclosed without essentially departing from the nature of the present invention and such departures and variations are anticipated as may fall within the scope of the following claims:

What is claimed is:

1. In a filament mount employing preformed twin inverted V-shaped filaments in spaced parallel relationship and electrically connected in parallel, means for setting up a substantial strain free parallel spaced relationship and parallel electrical connection with leading in wires of the filament mount which comprises twin inverted U-shaped filament connectors integral with the filament lead wires of said filament mount, said U connectors being spaced in parallel relationship in vertical planes apart substantially a distance equal to the distance apart of the ends of the preformed filament legs, and in a plane at right angles to the plane of said parallel filaments, the outer edges of the legs of said U connector being shaped to present parallel surfaces in the same vertical plane as the apex of said mounted preformed filament.

2. In a filament mount comprising a flare tube terminating at one end in a press, leading in wires passing through said press, a filament support member integral at one end with said press intermediate said lead wires, resilient spring suspension members oppositely disposed at the other end of said support member, twin inverted V-shaped filaments suspended from said suspension members, means for positioning said twin filaments in parallel spaced relationship and electrically connecting the legs thereof in parallel comprising an inverted U-shaped connector member integral with the ends of the leading-in wires passing through said press, said U connectors being positioned so as to lie vertically in planes parallel to the plane of said spring suspension members, and

spaced apart a distance substantially equal to the distance between the legs of the preformed filament, and at a vertical height so as to intercept the ends of said filament legs, the outer edges of the legs of said U connector being spaced a distance apart substantially equal to the distance apart of the apexes of said filaments in said spring suspension members so as to preserve parallel alignment of the legs of said filaments.

In testimony whereof, I have hereunto subscribed my name this 29th day of August, 1929.

WILLIAM WEINGARTNER.