

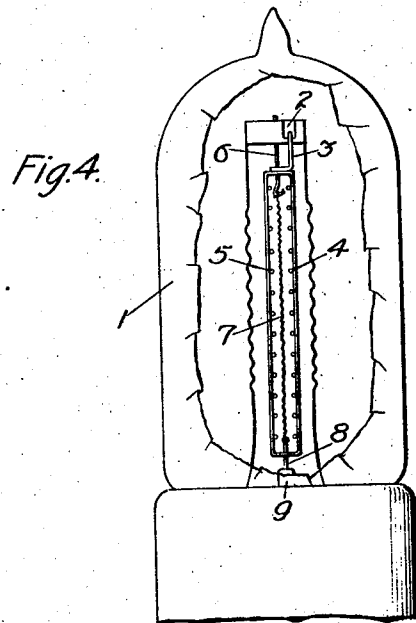
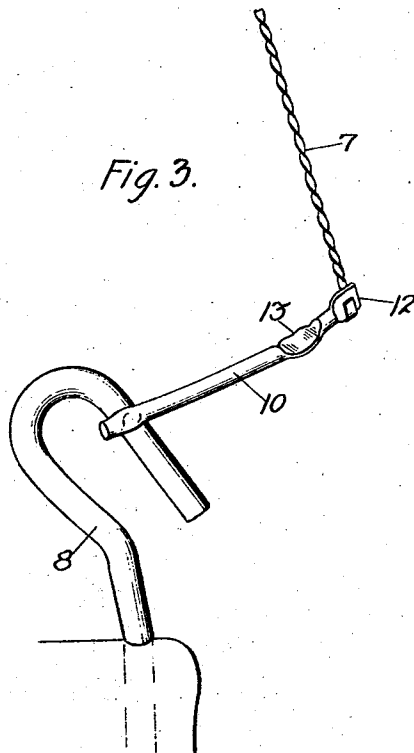
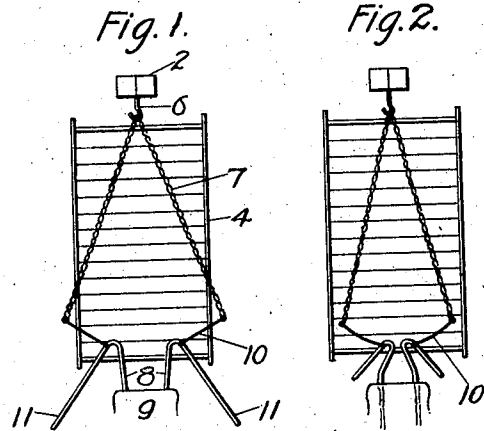
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1,522,286

H. P. CLAUSEN

METHOD AND APPARATUS FOR MOUNTING FILAMENTS

Filed Feb. 3, 1920



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UNITED STATES PATENT OFFICE.

HENRY P. CLAUSEN, OF MAMARONECK, NEW YORK, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD AND APPARATUS FOR MOUNTING FILAMENTS.

Application filed February 3, 1920. Serial No. 356,051.

To all whom it may concern:

Be it known that I, HENRY P. CLAUSEN, a citizen of the United States, residing at Mamaroneck, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Methods and Apparatus for Mounting Filaments, of which the following is a full, clear, concise, and exact description.

My present invention relates to electrical devices and more particularly to electrical lamps or vacuum tubes and it has for its object to improve in the manner of mounting the filaments used in these tubes, particularly when the space between electrodes is small.

The improvements have reference to properly tensioning the filament in a new and inexpensive way and to so connecting its ends to the lead-in wires that the attachments may be conveniently made with freedom exteriorly of the grid structure and the parts then positioned properly between the grids with greater ease than heretofore. To these and other ends the invention resides in certain improvements and combinations of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a fragmentary side view of a partially finished filament constructed and mounted in accordance with my invention;

Figure 2 is a similar view of the finished filament of my invention;

Figure 3 is an enlarged fragmentary detail view illustrative of a mode of joining the various wires, and

Figure 4 is a side view partly broken away of a vacuum tube of a type in which my invention may be utilized to advantage.

Similar reference numerals throughout the several views indicate the same parts.

Referring to the drawings, 1 indicates the tube and 2 the lavite or similar insulating block at the head thereof having depending lateral wires 3 that support the grids 4 and 5 and a central hook 6 supporting the intermediate portion or apex of the looped filament 7. The ends of the filament are connected to the respective lead-in wires 8 issuing from the stem 9.

In the practice of my present invention, I construct my lead-in wires 8 of compara-

tively heavy stock of any desired material such as copper, nickel, platinum, etc. that will have a strain resisting strength or stiffness though not a stiffness incompatible with the necessary pliability or plasticity to permit it to be bent to the desired form at a later stage. These wires as prepared initially are preferably given the form shown in Figure 1 and at a point intermediate of their length I weld or otherwise secure to each of them one end of a short tensioning wire 10. This wire is preferably a light weight, hard drawn wire the tension of which is not easily affected by heat, for instance, molybdenum. The other end of this tension wire is welded or clamped to an end of the filament 7 and at the time the stem assembly is completed, including the grid and filament, this point of attachment lies outside of the grid as before and as shown in Figure 1. I then use the projecting end portions 11 of the lead-in wires 8 to manipulate them by an inward bend so that they carry the ends of the filament to the desired positions inside of the grids as shown in Figure 2. In doing so, the spring connecting wires 10 are also carried inwardly and are placed under tension as shown in the same figures, so that the desired tension is communicated to the filament as it hangs upon its central hook support 6. Great latitude is attained in bending the lead-in wire 8 back and forth to cause the spring 10 to be placed in any desired position and the projecting end 11 of the wire forms a very convenient handle for effecting this bending operation with the greatest ease, it being unnecessary to enter an additional tool of any kind in the narrow space between the two sides of the grid. After the proper adjustment has been made, the surplus extension of the leading-in wire 8 may be cut off producing substantially the arrangement shown by Figure 2.

In Figure 3 I have shown an enlarged view of the welded joint between the tensioning wire 10 and the lead-in wire 8 and also a clamping connection at 12 that may be employed in joining the filament 7 to the outer end of the element 10. The wire 10 may be flattened at a point such as 13 in the manner shown so that the end of the wire has little or no lateral give.

It will be noted that my invention does not call for a spring support at the top

where the filament is fastened to the top of the stem assembly. I place the springs at the bottom where the leading in wires are located but overcome the difficulty of using the molybdenum wire as a leading-in wire by welding it to the comparatively heavy wire and I thus permit the use of any desired appropriate material as a leading-in wire that may prove more satisfactory for this purpose than would molybdenum or similar wire.

Another feature of importance is that if the leading-in wire is, say, nickel or copper, a material reduction in cost will be obtained through its being unnecessary to use more than a very small amount of molybdenum wire to secure the desired tension upon the filament. Other wire such as steel or nickel, could be used, particularly in the formation shown in Figure 3, and have a minimum amount of side play, thus keeping the filament in a central position between the two sides of the grid. Extreme variations in temperature result in some cases in a variation of approximately one-sixteenth of an inch in the length of the filament and in the practice of my invention, this variation is completely absorbed by the tensioning spring when properly adjusted.

What is claimed is:

1. A method of mounting vacuum tube filaments which comprises securing in the tube a lead-in wire substantially longer than its required final length, attaching an end of the filament to an intermediate portion of said wire, manipulating the free end of said wire to give the filament its position and tension, and then cutting off the excess portion of said wire.

2. A method of mounting vacuum tube filaments, which comprises attaching a pair of resilient wires to the ends of the filament, attaching said wires at a substantial angle to intermediate portions of a pair of lead-in wires, and bending said lead-in wires to flex said resilient wires and thereby tension said filament.

3. A method of mounting vacuum tube filaments between other electrodes thereof which comprises attaching connecting wires

to intermediate portions of the lead-in wires after the other electrodes are assembled, attaching the ends of the filament to the connecting wires at points exteriorly of the other electrodes and then manipulating the free ends of the lead-in wires to carry the attached ends of the filament between the other electrodes.

4. A method of mounting filaments in vacuum tubes of the type having an electrode surface at each side of the filament, which comprises securing a pair of plastic wires in the tube, attaching a pair of resilient wires to said plastic wires and to the ends of said filament with said ends extending outside the boundaries of said surfaces, and bending said plastic wires to position the filament within said boundaries and to tension the filament.

5. The combination with a vacuum tube filament and a support for one portion thereof, of a support for another portion thereof comprising a wire of plastic material secured in the tube, and a resilient wire attached to said plastic wire and to said other portion, said plastic wire being bent to a position to flex said resilient wire whereby tension is applied to said filament.

6. The combination with a vacuum tube filament and a central support therefor, of a pair of relatively heavy lead-in wires of plastic material, and a light resilient wire connecting each end of the filament to a lead-in wire, said lead-in wires being bent to positions to flex said resilient wires whereby tension is applied to said filament.

7. The combination with a vacuum tube filament and a central support therefor, of a pair of relatively heavy lead-in wires of plastic material, and a light hard drawn spring wire not easily affected by heat connected to each lead-in wire and to an end of the filament, said lead-in wires being bent to positions to flex said spring wires whereby tension is applied to said filament.

In witness whereof, I hereunto subscribe my name this 28th day of January, A. D., 1920.

HENRY P. CLAUSEN.