Dec. 29, 1925. 1,568,026

J. B. ZETKA

ELECTRON DISCHARGE DEVICE

Filed June 24, 1924

Fig. 1.

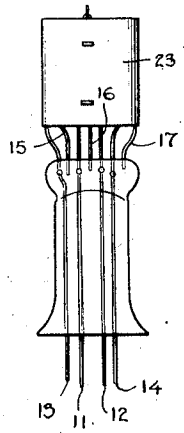


Fig. 2.

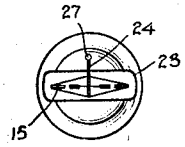


Fig. 3.

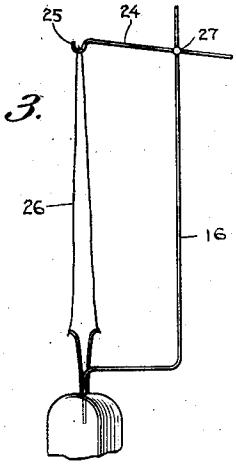


Fig. 4.

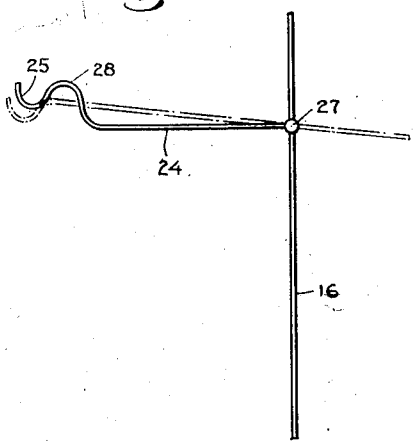
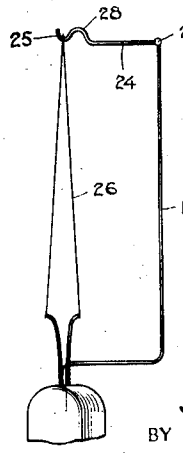


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH B. ZETKA, OF NUTLEY, NEW JERSEY, ASSIGNOR TO BRIGHTSON LABORATORIES, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRON-DISCHARGE DEVICE.

Application filed June 24, 1924. Serial No. 722,076.

To all whom it may concern:

Be it known that I, JOSEPH B. ZETKA, a citizen of the United States, and a resident of Nutley, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Electron-Discharge Devices, of which the following is a full, clear, concise, and exact description.

While my invention is capable of a broad field of utility, I will, for the purpose of convenience, describe and illustrate in connection with an evacuated vessel or tube which is intended to be employed for the purpose generally of rectifying currents and more particularly for rectifying, detecting, oscillating and amplifying currents both of the audio and of radio frequency in the reception and transmission of waves of radio frequencies; and while for purposes of convenience, I will hereinafter refer to my invention as employed to such end, it will be understood that this is done for convenience only, and that as far as the claims permit, the invention is capable of a broader field of utility.

In the multi-element vacuum tube as for instance, the 3-element tube illustrated in the drawings, the operation of the tube for the purpose intended is tied up more or less with the manner in which the filament is supported, since I have discovered that the microphonic noises frequently, if not generally, present when such tubes are used, is due in part if not wholly to the manner in which the filament is supported, with the expansion and contraction of the filament incident to its heating as a current is passed therethrough, not only does the filament tend to maintain its predetermined parallel association with the rest of the elements of the tube, but in addition the tension under which the filament is maintained, will vary from time to time.

One of the important objects of my invention, therefore, is an arrangement for so supporting the filament as to maintain such filament at all times, not only in its predetermined position but also in the desired predetermined tension to cause the tube to operate at all times at a uniform and maximum efficiency.

For the purpose of attaining these objects and such other objects as may hereinafter appear or be pointed out, I have illustrated one embodiment of my invention in connection with the process employed by me in the drawings, wherein—

Fig. 1 shows the stem of the tube with the various elements assembled thereon and the leads thereto;

Fig. 2 is the top plan view of this assembly;

Fig. 3 shows the first step in the association of the filament in the assembly;

Fig. 4 a second step in such association;

Fig. 5, the filament in its final assembled form on the stem.

Before describing my invention, I will premise that the embodiment in connection with which my invention has been illustrated, is a conventional type of radio tube in which there is fixed a glass stem 10 having embedded therein and passing therethrough the four leads, two of which are filament leads 11 and 12, one of which is the plate lead 13 and the fourth of which is a grid lead 14. There are also embedded in the stem 10 the three supports 15, 16 and 17, one for each of the three elements of the tube. In Fig. 1 of the drawing, I have illustrated a stem of this character with the leads and anchor embedded therein.

The filament support 16 in Fig. 3, it will be observed, is embedded in the stem 10 at 21, is bent at 22, to offset the upper part thereof to the side of the plate 23 so as to provide room for the plate, and it will therefore be understood that the filament stem while positioned along the line of the short central axis of the stem, is displaced to the side of the central longitudinal axis thereof. I attach in any preferred or desired manner to the upper part of the filament support 16 the filament anchoring element 24, preferably, although not necessarily, made of molybdenum which is purposely given the shape and character shown in Fig. 5 of the drawing in the manner and for the purpose which I will now more fully set forth.

The anchor piece 24 is first bent at its outer free end to form the upwardly opening hook 25, in which is received the filament 26 and is then held substantially in the position shown in Fig. 3 with the anchor piece against the support 16 and at an angle thereto, the hook 25 first having been passed under the filament so as to catch therebeneath, and the position of the anchor piece with reference to the length of the filament

26 being such that the filament is held extended for its normal length. And the anchor member 24 is then fixed in its position by being secured to the support 16 as by spot welding.

It will, of course, be understood upon observing Fig. 3 that this anchor piece 24 is angularly positioned with reference to the support 16 and is so positioned that the filament 26 is fully extended. I now simultaneously form the downwardly opening bend 28 (see Fig. 4) in this anchor piece and at the same time move the anchor piece 24 as a whole so as to cause it to assume the horizontal position, the bend 28 being of such a character and such a size as to cause the hook portion 25 to be moved above the position upon which it preliminarily occupied, as in Fig. 3 of the drawing. In other words, as a result of this operation upon the anchor piece 24, the anchor piece as a whole has moved downward to its horizontal position, but the hook 25 has been caused to move reversely, that is upwardly, and due to the formation of the bend 28, will occupy a position somewhat nearer the support 16 than it did originally. This raising of the hook 25 will produce an upward pull on the filament, and due to the relative inextensibility of the filament, will be sprung slightly downwardly. In other words, in this manner I not only support the filament fully extended, but the filament when so supported tends to move the anchor piece 24 downwardly from its normal. As a result of this, any expansion of the filament resulting from its being heated will be taken up by the movement of the anchor piece 24 towards its normal horizontal position.

In this manner, I have obtained a support for the filament which is inexpensive to make and easy to position, but which in its normal operation functions to maintain the filament at all times properly positioned and fully extended, and that this functioning of the filament support is obtained without the employment of any extraneous features and merely by giving to the member 28 the reverse bends and the angular movement as set forth.

Having illustrated my invention and described its use, what I desire to claim and to secure by Letters Patent is:

1. In a device of the character described, in combination, a support, a filament carrying member secured thereto and extending angularly therefrom, said member having its free end curved into an ogee whereby a filament carried from such free end may be maintained under the desired spring tension.

2. In a device of the character described, in combination, a support, a filament carrying member secured thereto and extending angularly therefrom, said member having its free end curved into an ogee with the upwardly opening part of the ogee positioned at the extreme end whereby a filament carried from such free end may be maintained under the desired spring tension.

3. The process of supporting a filament under spring tension which comprises first supporting a filament from a resilient member and then placing the member under elastic stress by putting a permanent bend therein whereby the filament will be supported under such stress and the member will accommodate itself to the contraction and expansion of the filament to always maintain said filament in fully extended condition.

4. The process of supporting a filament under spring tension which comprises first supporting a filament from a resilient member and then placing the member under elastic stress by bending it into an ogee whereby the filament will be supported under such stress and the member will accommodate itself to the contraction and expansion of the filament to always maintain said filament in fully extended condition.

5. The process of tensioning a filament supported from the hook of a resilient member which process consists in placing a permanent bend in said member so as to place it under elastic stress, whereby the filament will be supported under such stress and the member will accommodate itself to the contraction and expansion of the filament to always maintain said filament in fully extended condition.

In testimony whereof, I have signed this specification, this 21st day of June, 1924.

JOS. B. ZETKA.