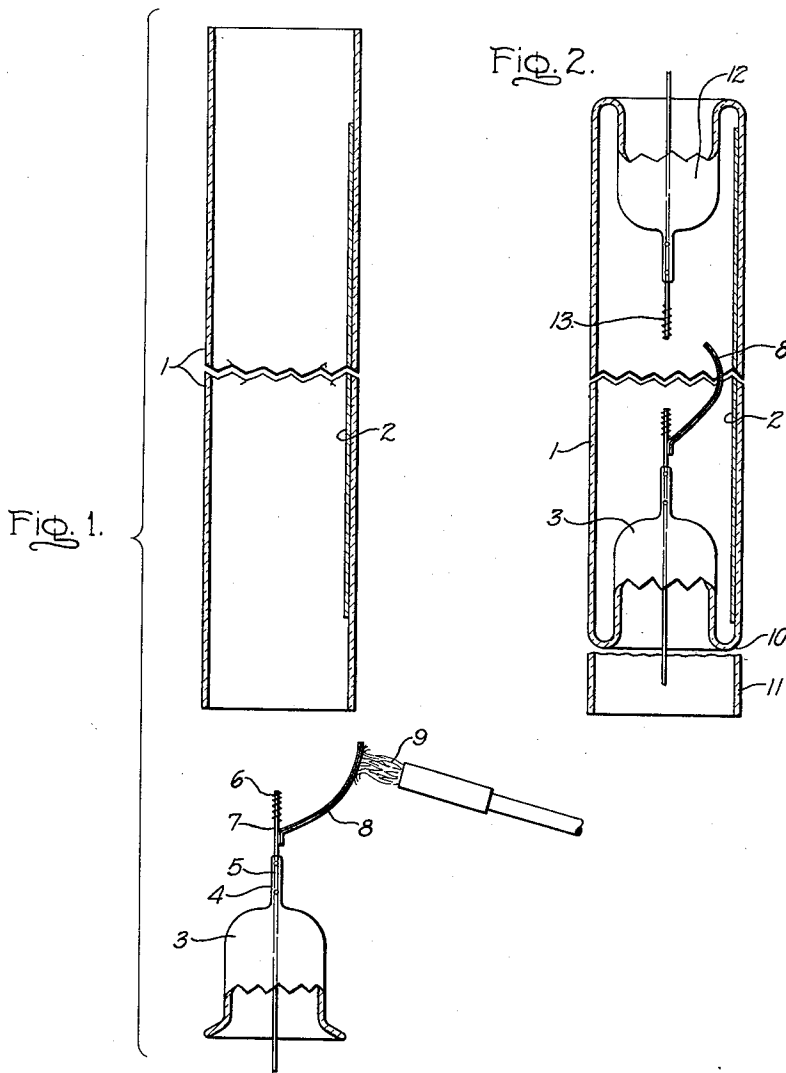


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ELECTRIC DISCHARGE DEVICE

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ELECTRIC DISCHARGE DEVICE

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1

Our invention relates to electrical discharge tubes having an electrically conductive layer on the inner surface of the wall to which an electric potential must be applied in the use of said discharge tube. This obtains, for example, in gas and/or vapor discharge tubes which are provided with a conductive layer located on the inner side of the tube wall and which extends along a greater part of the length of the tube. This conductive layer must be connected at least during the ignition or starting of the discharge to one main electrode to make the ignition easier. The conductive layer thus obtains the potential of that electrode. Also in other types of discharge tubes, for example, electron ray tubes, conductive coatings have to be placed at certain potentials on the wall.

To make the necessary electrical connection with the conductive layer use can be made of a metal strip which bears under spring pressure against the conductive layer. It has been found that there are disadvantages in this manner of construction. During the manufacture of the discharge tube, the wall is heated to a high temperature. This is particularly so during the sealing-in process of fusing to the tube the stem portion of the so-called "mount" which carries the electrodes. It has been found that during this heating process the portion of the tube wall against which the spring strip presses becomes soft and pliable and quite often is permanently deformed, leading to damage of the part of the conductive layer which is located between the conductive strip and the tube wall. This may result in an unsatisfactory contact between the strip and the layer.

An object of our invention is to provide a construction which overcomes these disadvantages.

In a discharge tube in accordance with the invention, the contact is made by means of a bimetal element which when not heated makes contact with the conductive layer on the tube wall and is mounted in such a way that the electrical contact is prevented at sufficient heating of the bimetal element. When, during manufacture, the wall of the discharge tube is heated strongly at the location on the contact, the bimetal element also assumes a higher temperature through which it changes its shape, resulting in breaking the contact to the conductive layer. The bimetal element cannot exert and undesirable high pressure against the conductive layer and the wall of the tube.

As is already known, discharge tubes as a rule are closed off by a so-called stem consisting of

2

a dish or flat disc which may carry one or more electrodes or other parts of the tube and is fastened to the tube by a vacuum tight seal. The metal strip intended to make contact with the conductive layer can also be mounted on this device. In this case, the construction in accordance with the invention is particularly advantageous. If the strip is not made of bimetal in accordance with the invention, damage of the conductive layer, which is preferably very thin, may occur in many cases when the device is being inserted into the tube end. In accordance with the invention, the bimetal element can be heated when the device that closes the tube is sealed in. This will change the shape of the bimetal element so that during the sealing into the tube it does not scrape along the wall of the tube.

The invention will be explained in detail with the aid of the accompanying drawing in which Fig. 1 is an elevation, partly in section, of a tube and a "mount" structure prior to assembly, and Fig. 2 is a similar view after assembly.

In Figure 1, 1 represents a cylindrical glass tube or envelope from which a gas discharge tube is to be made. The inner side of the tube is provided with a thin conductive layer 2 which, for example, consists of silver and which facilitates the ignition of the discharge. This layer, which may be 3 mm. wide for example, is extended over practically the entire length of the tube 1. In this figure, 3 represents a glass stem of conventional shape. The lead-in wire 5 of the electrode 6 which is provided with a material which emits electrons easily, is sealed through the pinch or press portion 4 of the stem 3. A bimetal strip 8 is fastened to the supporting wire 7 of this electrode (the width of the bimetal strip is 2 mm.). The stem 3 together with the electrode 6, the supporting wire 7 and the bimetal strip 8 constitute a "mount" which is being inserted in the end of the tube 1. In this process the bimetal strip 8 is heated by a gas flame 9. The bimetal element is so constructed that when heated it bends towards the electrode 6 and to such an amount that the electrode can be inserted into the tube 1 along the axis of the same without the bimetal element touching the wall of the tube nor the conductive layer 2 deposited thereon. The stem 3 will be moved into the tube 1 for a little distance (see Figure 2), after which the tube 1 and the stem 3 are fused together at 10 in the known manner, and the remaining part 11 of the tube drops off. During the fusion of the stem to the tube, the bimetal element 8 will re-

3

main so hot due to the heating of the tube end that it does not make contact with the conductive layer, thus preventing too great a contact pressure during the sealing-in process. When the bimetal element 8 cools off it bends outward and makes contact with the conductive layer 2.

At the other end of the tube a mount comprising a stem 12 with electrode 13 is also fused to the tube 1, after which the discharge tube can be evacuated in a known manner and filled with a gas or a metal vapor filling. The inner side of the wall of the tube can also be covered previously with a fluorescent layer.

The parts comprising the bimetal element can be chosen so that the element when heated in the normal use of the discharge tube will not be moved away from the conductive layer 2. In this case of course, when the mount is inserted in the tube 1 the bimetal element must be heated to a higher temperature than during normal use of the discharge tube. The bimetal element 8 may also be so designed that it is sufficiently distorted by the heat generated during normal operation of the discharge so that contact with the conductive layer 2 will be broken.

The bimetal element 8 need not necessarily be supported by a supporting wire of the electrode 6. It is also possible to locate a separate supporting wire in the pinch 4 and to connect this wire electrically to the electrode 6 inside or outside the vacuum space of the discharge tube. The device that closes off the tube 1 can also have an entirely different shape than the stem 3 as shown. It is, for example, known that the electrode can be mounted on a dish or disc shaped device which may be made of glass or metal and that this device can be fastened to the wall of the tube by fusion. The electrode 6 can also be provided with two current carrying or lead-in wires by means of which it becomes possible during the manufacturing process or also at the ignition or normal operation of the discharge tube to pass an electric current through electrode 6.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. The method of establishing an electrical connection between a mount structure of an electric discharge device and a conductive layer on the inner surface of the envelope of said device, which method comprises securing a bimetallic element to the mount structure before inserting said mount structure in said envelope and in such a manner that the bimetallic element when unheated extends laterally of the mount structure but bends back toward the mount structure when sufficiently heated, heating the bimetallic element sufficiently so that it is bent back out of engagement with the wall of the envelope and the conductive layer during assembly of the envelope and the mount structure, inserting the mount structure into the envelope while the bimetallic element is bent back as aforesaid, and sealing the mount structure to the envelope in such a position that the bimetallic element will engage said conductive layer when unheated and thereby establish an electrical connection between said mount structure and said conductive layer.

2. An electric discharge device comprising a

4

sealed tubular envelope having stems sealed into its ends and carrying electrodes, said envelope containing an ionizable gaseous atmosphere and having on its inner surface a conductive layer on which a potential is to be applied for facilitating the start of an electric discharge between said electrodes, said layer extending along the gap between said electrodes and being closer to said electrodes than the distance between said electrodes, means for connecting said layer to one of said electrodes comprising a bimetallic element mounted on one of said stems and electrically connected to the adjacent electrode, said bimetallic element being supported and arranged so that a portion of it engages said layer when not heated and is distorted out of engagement with said layer on application of sufficient heat thereto.

3. An electric discharge device comprising a tubular envelope having stems sealed into its ends and carrying electrodes, said envelope containing an ionizable gaseous atmosphere and having on its inner surface a silver layer on which a potential is to be applied for facilitating the start of an electric discharge between said electrodes, said silver layer extending along the gap between said electrodes and being closer to said electrodes than the distance between said electrodes, means for connecting said layer to one of said electrodes comprising a bimetallic element mounted on one of said stems and electrically connected to the adjacent electrode, said bimetallic element being supported and arranged so that a portion of it engages said layer when not heated and is distorted out of engagement with said layer on application of sufficient heat thereto.

4. An electric discharge device comprising a sealed envelope having electrodes, one of which is mounted on a stem, sealed into its ends and having on its inner surface a conductive layer on which a potential is to be applied, said layer extending along the gap between said electrodes and being closer to said electrodes than the distance between said electrodes, means for connecting said layer to one of said electrodes comprising a bimetallic element mounted on said stem and electrically connected to the adjacent electrode, said bimetallic element being supported and arranged so that a portion of it engages said layer when not heated and is distorted out of engagement with said layer on application of sufficient heat thereto.

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