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INDIRECTLY HEATED CATHODE FOR DISCHARGE TUBES

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Fig. 1a

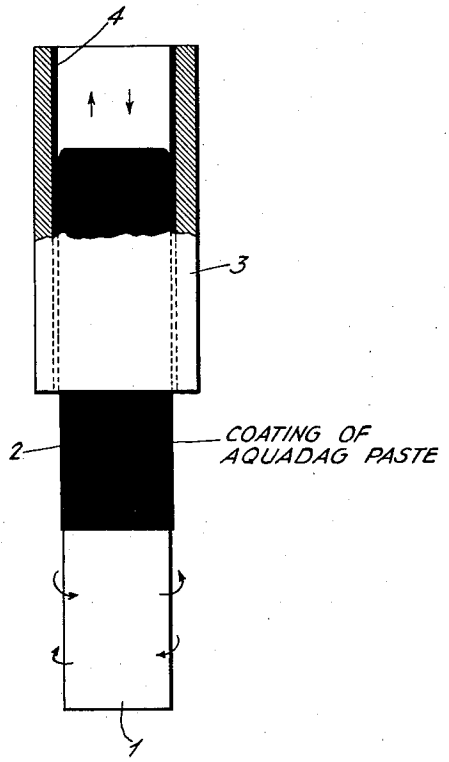
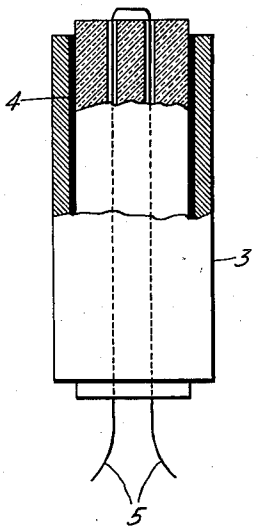


Fig. 1b



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INDIRECTLY HEATED CATHODE FOR DISCHARGE TUBES

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3 Claims. (Cl. 250—27.5)

This invention relates to an indirectly heated cathode for electric discharge tubes and more particularly to cathodes consisting of a heating element surrounded by a cathode sleeve or body, insulating material being provided, if desired, between said members.

A well known phenomenon occurring when using discharge tubes comprising cathodes of this type is that it takes often very long before the cathode has been heated from the heating member to the temperature required for emission. This phenomenon manifests itself in that often a considerable time elapses before sound is reproduced by a radio set after it has been switched on.

We have now succeeded in constructing a cathode by means of which this drawback is entirely avoided or at least reduced to a great extent. According to the invention the cathode heating member and/or the side of the cathode body facing said heating member is coated with a substance having a large heat radiating capacity. It is also possible to make one or both of said members entirely or partly of such a material. We have found it advantageous to coat these surfaces with a substance acting perfectly as a black body and for this purpose vanadium trioxide is preferably used. However, the effect aimed at by the invention can also be achieved by treating said surfaces with nickel oxide or carbon. By means of this construction it is ensured that there are one or more surfaces having a large heat radiating capacity between the heating member and the cathode body. In fact, when providing insulating material between the heating member and the cathode it is advisable to coat this material on one or both sides with a material having a large heat radiating capacity. Due to these constructions the time required for heating the cathode to the emission temperature is greatly reduced.

The constructions described above are more particularly adapted for use with cathodes the cathode sleeves of which consist entirely or partly of a substance, for instance, copper or silver, whose heat radiating capacity is smaller than that of nickel. When using such materials without the aid of our invention the time required for reaching the emission temperature is often very considerable. Indeed, in this case a comparatively small quantity of energy is sufficient for heating the cathode to a definite temperature. Since, however, the cathode must be heated to the same temperature as a cathode body consisting, for instance, of nickel, the time required for reaching this temperature is usually fairly considerable. Therefore, it is desired especially with these cathodes to provide means by which the time required for heating is reduced.

The invention will be more clearly understood by reference to the accompanying drawing representing, by way of example, one embodiment thereof.

A rod 1 consisting, for instance, of magnesium oxide is immersed in Aquadag paste so that it is covered with a thin layer 2 of said paste. This rod is introduced into a cathode sleeve 3 which may be of copper, nickel or other suitable material and turned about a few times so as to intimately contact with the inner wall thereof. After removing the rod and after drying the cathode sleeve at room temperature, the inner wall of the sleeve is coated with a uniform black layer 4. If desired the Aquadag paste may be permitted to flow through the long cathode tube from which the cathode sleeves are cut.

After this treatment an insulating rod or tube of, for instance, magnesium oxide or aluminum oxide, is inserted in the cathode sleeve or tube and the heater element 5 of filamentary form, which may itself be coated with insulating material, if desired, is then threaded through said insulating rod or tube, whereupon the cathode thus formed together with the other electrodes are mounted within the evacuated envelope, the other operations required for the manufacture of the tube being effected in the usual manner.

Another method within the spirit of the present invention is to smear the insulating tube which is to be provided between the heating member and the cathode sleeve and tube with graphite, or to blacken it by coating with a layer of vanadium trioxide. The insulating tube thus coated and having the heater threaded therethrough is then inserted within the cathode tube, further mounting thereof and other electrodes being effected in a normal manner.

It appears from what has been described above that various forms of cathode construction according to the present invention are possible and it is therefore desired not to be limited except by the appended claims.

What we claim is:

1. An indirectly heated cathode for electron discharge tubes comprising a tubular electron emitting member of metal having a lower heat radiating capacity than nickel, and means for increasing the heat radiating capacity of said tubular member comprising a coating of vana-

dium trioxide on the inner surface of said member.

2. An indirectly heated cathode for electron discharge tubes comprising a tubular electron emitting member of copper, and means for increasing the heat radiating capacity of said member, comprising a coating of vanadium trioxide on the inner surface of said copper member.

3. An indirectly heated cathode for electron discharge tubes comprising a tubular electron emitting member of silver, and means for increasing the heat radiating capacity of said member, comprising a coating of vanadium trioxide on the inner surface of said silver member.

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