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CATHODE COATINGS

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This invention relates to an electron-emissive coating for thermionic type cathodes and to the method of producing coated cathodes of this type.

An object of this invention is to produce a thermionic cathode which shall have a substantially increased thermionic emission.

Another object is to increase the intensity with which the coating adheres to the core metal of the cathode and thus increase the life of the cathode under severe load conditions.

The foregoing and other objects of this invention will be best understood from the following description of exemplifications thereof.

In accordance with invention I add to the usual alkaline earth metal carbonate coating mixture, which may, for example, consist of barium carbonate and strontium carbonate, a hydrated barium peroxide ($BaO_2H_2O_2$). While I prefer to use hydrated barium peroxide ($BaO_2H_2O_2$), any other peroxide in which the barium is replaced by any other alkaline earth metal may be used. I prefer that the peroxide shall constitute about 25 per cent by weight of the total mixture of dry ingredients. To the above mixture may be added the usual vehicles, such as, amyl-acetate and nitrocellulose lacquer. In accordance with my present understanding of the invention the peroxide performs the function of a binder. However, it may perform additional functions in view of the remarkable results which are secured as a result of its use.

A thermionic cathode, either of the indirectly heated or of the filamentary type, may be coated with the above coating material, either by painting, spraying, dipping, or the like, until the core metal of the cathode carries a sufficiently heavy layer of coating. The coating is then dried in air. It is then assembled and sealed into the electronic tube in which it is to be utilized. Thereupon the tube is exhausted to a relatively high vacuum and the cathode heated to a temperature of about 450° centigrade. At this point, fusing of the peroxide takes place and some of the carbonate appears to dissolve in the molten peroxide. However, an insufficient amount of peroxide is used to dissolve completely all of the carbonate. During this heating process, some gas is evolved from the cathode coating. I believe that under these conditions the peroxide breaks down, at least partially, into the dioxide form, such as BaO_2. After the above heating process has been completed, the cathode temperature is raised to about 800° centigrade. At this temperature the carbonates, as well as any other compounds remaining, break down so as to leave a residuum of barium oxide and strontium oxide as the final cathode coating.

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I have found that the coating of the cathode as prepared above consists of a mass of finely interlocking crystals which are in extremely close thermal and electrical contact with the cathode core metal. Also the crystals throughout the mass of coating itself are in similarly close thermal and electrical contact with each other.

When cathodes are constructed in accordance with my invention, as described above, I have been able to obtain therefrom copius thermionic emission at temperatures corresponding to below red heat. As the temperature of the cathode is increased beyond this point, an extraordinarily large degree of thermionic emission is obtained. As compared with cathodes coated in accordance with heretofore commercial practice, cathodes constructed in accordance with the present invention have had their emission increased about two and one-half times at corresponding operating temperatures.

What is claimed is:

1. A cathode-coating material consisting of an amyl acetate-nitrocellulose lacquer containing the carbonate of an alkaline-earth metal and a substantial amount of $BaO_2H_2O_2$.

2. A cathode-coating material consisting of an amyl acetate-nitrocellulose lacquer containing the carbonate of an alkaline-earth metal as a major component and a substantial amount of $BaO_2H_2O_2$ as a minor component.

3. A cathode-coating material consisting of an amyl acetate-nitrocellulose lacquer containing a mixture of about 75% of the carbonate of an alkaline-earth metal and about 25% of $BaO_2H_2O_2$.

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REFERENCES CITED

The following references are of record in the file of this patent:

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