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MANUFACTURE OF SINTERED CATHODES

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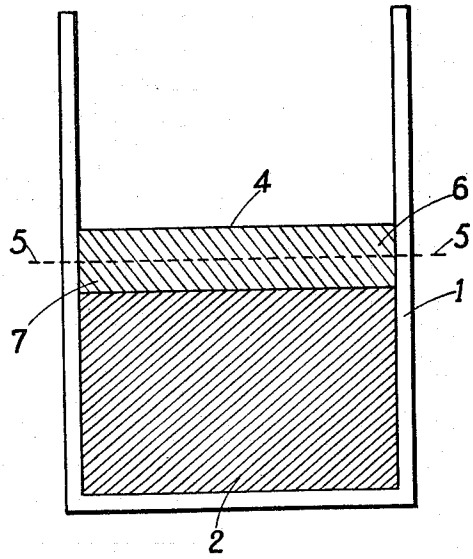

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MANUFACTURE OF SINTERED CATHODES

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3 Claims. (Cl. 29—182.5)

The present invention relates to a process of manufacture of the emissive part of sintered cathodes.

It is known to cover the emissive portion of cathodes of certain types either with a bunch of fine metallic wires or with a coating obtained by projecting thereon, by means of a Shoop gun, metallic particles in suspension in a liquid which is subsequently volatilized.

Both methods have the disadvantage that they do not always permit obtaining the desired porosity, while the second method also has the disadvantage of poisoning the cathode with the burnt gases entrained by the metallic particles.

It is an object of the present invention to provide a method of manufacture of emissive tablets for sintered cathodes, i.e. those obtained by compression and sintering of a mixture of emissive powders, this process having none of the above-mentioned disadvantages. Another object of the invention is to provide tablets for sintered cathodes obtained by means of the above process.

The process of the invention comprises in combination the following operations: mixing the constituents of a barium emissive composition in the fine powder state; compressing the obtained mixture under high pressure in a mold for shaping the tablet; providing a superficial layer of refractory metal in the form of a fine powder on the tablet thus obtained; again compressing the tablet, sintering and machining the same.

Further features and advantages of the invention will appear from the ensuing description which is given merely by way of example.

Reference will be had in this respect to the accompanying drawing in which a cathode embodying the invention has been diagrammatically illustrated in longitudinal section.

This cathode is obtained in the following manner:

Barium tungstate ($3BaO+WO_3$), aluminum and tungsten powders are mixed and ground for several hours to form an intimate mixture, the molecular proportions being as follows: $5(3BaO+WO_3)+15Al+80W$.

The size of the grains of the final mixture is between 1 and 30 microns. A cavity portion of a mold 1 is filled with this mixture so as to provide an emissive layer 2 about 2 mm. thick. This emissive mixture is highly compressed in the mold by means of a press capable of providing a pressure of between 1 and 30 metric tons/cm.^{2}.

This emissive mixture is covered with a layer 4 of tungsten powder about 100μ thick and the whole is once more highly compressed by means of a press capable of exerting pressures between 1 and 30 metric tons/cm.^{2}. Thus, the tungsten powder layer is a fraction, namely about .05, of the emissive layer which is about two millimeters thick.

The cathode thus obtained is sintered in an argon atmosphere at a temperature between 2,400° F. and 3,272° F. for a period ranging from 3 hours to 5 minutes.

The mold is thereafter cut along the plane 5—5 and

the portion 6 of the metallic powder coating 4, disposed above the plane 5—5, is ground off. The surface 5—5 is perfectly polished and planed. A cathode is thus obtained which is built up by a mold 1 containing a quantity 2 of an emissive substance, which has a thickness of about 1 to 2 mm. and is covered with a film 7 of compressed metallic powder, having a thickness of 10 to 20μ.

The porosity of the coating of metallic powder is intimately related to the intensity of the pressure to which it has been subjected. This pressure is therefore selected so as to obtain the desired porosity for the application intended.

The invention is not to be limited to the illustrative mode of carrying out the same nor to the indicated bodies, or pressure magnitudes and baking characteristics. The metal selected for the coating will depend essentially on the constitution of the barium emissive mixture. It is to be understood that the composition of the latter, given above, is in no way characteristic of the invention, which is primarily concerned with the method of obtaining the metallic coating 7. Further, the mold of the cathode may have any shape, suitable for the particular application, other than the one shown.

We claim:

1. In a method of manufacturing a tablet to be used as emissive portion of a sintered cathode for electron discharge tubes, comprising the steps of filling a container with a barium emissive composition in powder state; initially compressing said composition; covering said initially compressed composition with a superficial layer of a refractory metallic powder having a thickness which is a fraction, about .05, of that of said initially compressed composition; thereafter pressing said metallic powder onto said initially compressed composition to form a porous tablet and sintering said tablet at high temperature.

2. The method of manufacturing a tablet to be used as emissive portion of a sintered cathode for electron discharge tubes, comprising the steps of filling a container with a barium emissive composition in powder state; initially compressing said composition; covering said initially compressed composition with a superficial layer of a refractory metallic powder having a thickness which is a fraction of that of said initially compressed composition; thereafter exerting a pressure on said layer for pressing said metallic powder onto said initially compressed composition to form a porous tablet having a metal layer covering said emissive composition; controlling said pressure to determine the porosity of said metal layer; sintering said tablet at a high temperature; and removing the top part of said layer and planing and polishing the top surface of the remaining part of said layer to leave a portion of said metal layer as a film about ten to twenty microns in thickness covering said emissive composition.

3. A tablet to be used as emissive portion of a sintered cathode, comprising a metallic surface layer obtained by the method of claim 2, said emissive composition having a thickness of about one to two millimeters and said film having a thickness of about ten to twenty microns.

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