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PROCESS FOR THE PRODUCTION OF ANODE MATERIAL FOR
ELECTROTHERMICALLY MODULABLE RADIATORS
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Fig. 1



Fig. 2

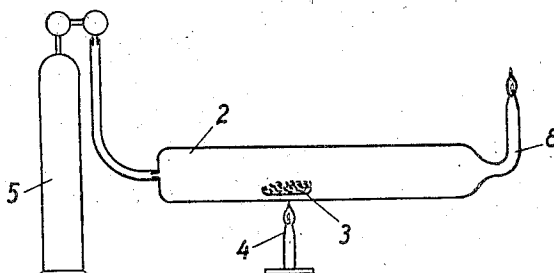
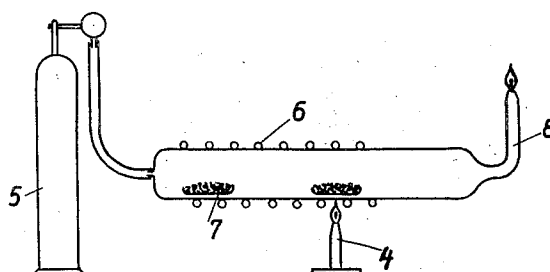


Fig. 3



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PROCESS FOR THE PRODUCTION OF ANODE MATERIAL FOR ELECTROTHERMICALLY MODULABLE RADIATORS

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4 Claims. (Cl. 176—1)

The present invention relates to a process for the production of anode-material for electrothermically modulable radiators, such as are used, for example, in producing a modulated beam of light, as in light-telephony, by the bombardment of an anode by electrons.

For these purposes it is extremely important to obtain a very pronounced modulability of the emitted current of light at higher frequencies, a lesser average illuminating density having to be taken into account.

According to the present invention an anode-material fulfilling the above-mentioned requirement is produced by carbonizing a vegetable or animal organism; a raw material possessing extraordinarily thin cellular walls being chosen in order to obtain a small heat capacity of the carbon structure. In this connection it is suitable to remove by boiling in different solvents first the soluble components of the organic cell-structure, so that only the insoluble components are transformed into carbon. In order to further decrease the heat capacity of a cellular-wall structure produced in the manner described, the material now is annealed at high temperatures, e. g., in an oxidizing atmosphere (CO_2 , H_2O -vapor) or in pure hydrogen. During this latter process the carbon is slowly carried off, and the thickness of the cellular walls, and thus also the heat capacity of the cell-structure, therefore is reduced.

From such a thin-walled carbon skeleton, according to the present invention produced in the manner described, a metallic structure now, however, also may be produced. By way of an example this may be accomplished by annealing in a vacuum in the presence of a metal oxide volatile at high temperatures (e. g., tungsten oxides, tantalum-oxides). During this latter process the metal oxide is reduced to metal by the carbon of the cell-structure. When this is suitably executed the original cell-structure remains wholly intact after the said reduction. Carbon residuals which might have remained may be easily removed by annealing in pure hydrogen.

A further possibility of producing a metal structure from the thin-walled carbon skeleton presents itself by annealing the latter in an atmosphere containing the metal in a gaseous form. The carbon skeleton, e. g., may be heated to a dark red in an atmosphere of tungsten chloride, the pure metal being deposited on the hot cell-walls. Again, if this latter process takes place at high temperatures, the metal carbide is formed directly. By a subsequent annealing in

a current of hydrogen the carbon may be eliminated so that the metal structure remains.

In both these latter cases the metal structure may be transformed, by annealing in an atmosphere containing carbon, into a structure consisting of the corresponding carbide with a high point of fusion.

As compared with the simple carbon skeleton the metal structure produced according to the present invention possesses the advantage of a higher point of evaporation, increasing thereby the operating temperature of the radiator by several hundred degrees centigrade.

Apparatus for carrying out the above-described process, and also a typical product of my process, are illustrated schematically and by way of example on the attached drawing, wherein,

Fig. 1 illustrates the structure of the anode material, on an enlarged scale, prepared in accordance with the invention;

Fig. 2 illustrates a suitable arrangement for carrying out the first stage of the process; while

Fig. 3 shows the arrangement for performing the second or metallizing stage of the process.

As can be seen from Fig. 1, the metallized product obtained in accordance with the invention is cellular in structure and in fact follows the cellular structure of the original carbonaceous vegetable or animal material.

Figs. 2 and 3 show schematically an organization of parts for carrying out the initial and final stages of the process, that is, the carbonization of the cellular material and reduction of the cell wall thickness. The heating is effected in a cylinder 2 in which the cellular material is positioned on a support 3. A hydrogen flask 5 is connected with the cylinder 2 while a heating device, such as a Bunsen burner 4 is positioned to heat the material to be carbonized. The hydrogen escaping through the discharge neck 8 can be burned, as illustrated. The heating in the cylinder 2 is continued until the material is carbonized and thereupon hydrogen is admitted until the desired reduction in the thickness of the cell walls is attained. The cellular material can, of course, be carbonized before being introduced into the cylinder 2.

The metallization of the carbonized structure of reduced cell wall thickness may be effected with the aid of an electric heating coil 6 positioned about the cylinder 2 and acting to heat a suitable volatile metal salt in the pan 7. In this way the carbon structure is converted into one whose walls now contain also the metal in question by reason of the action of the vaporized salt

on the cellular residue. The carbon structure is heated still higher by the burner 4 and the pure metal separates out upon it or there is formed the metal carbide directly. By heating or annealing in pure hydrogen, the carbon can be driven off, so that a cellular structure composed substantially entirely of metal remains.

The nature of the present invention is such that the processes described may be varied without, however, deviating from the essence of the invention.

What I claim and desire to secure by Letters Patent is:

1. In a process for producing an anode material suitable for electrothermically modulable radiators heated by a controlled bombardment of electrons, the steps which comprise carbonizing an organic material of cellular structure having thin cell walls, annealing the carbon skeleton in a carbon-dissolving atmosphere to reduce the thickness of the cell walls, whereby a cellular carbon skeleton of low heat capacity is obtained, and depositing a metal on the carbon skeleton.

2. A process for producing an anode material suitable for electrothermically modulable radiators heated by a controlled bombardment of electrons, comprising carbonizing an organic ma-

terial of cellular structure having thin cell walls, depositing a high melting point metal on the resulting cellular carbon skeleton, and removing the carbon skeleton residue by heating in a carbon-absorbing current of gas.

3. A process for producing an anode material suitable for electrothermically modulable radiators which comprises removing soluble components from an organic cellular material, carbonizing the residual cellular structure, heating the same in a vapor capable of depositing a high melting point metal upon the carbon skeleton and heating the metallized cellular structure in an atmosphere capable of removing the carbon residue.

4. A process for producing an anode material suitable for electrothermically modulable radiators which comprises removing soluble components from an organic cellular material, carbonizing the residual cellular structure, heating the same in a vapor capable of depositing a high melting point metal upon the carbon skeleton and heating the metallized cellular structure in a hydrogen atmosphere to remove the carbon residue.

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