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CATHODE DISINTEGRATION

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The present invention relates to an improved process of cathode disintegration.

Metallic layers obtained by cathode disintegration upon smooth supports such as glass, porcelain, enamel, etc., have in general this drawback that they are not very adherent and that they do not withstand electric charges when the layer is inserted in an electric circuit as an electric resistance such as a heating element, etc.

The object of the invention is to obtain by cathode disintegration strongly adhering and resisting metal layers.

The invention is characterized in that a hard metal of the iron or tungsten groups (periodic system) is first deposited by cathode disintegration upon a suitable support, and afterwards another metal, which would not give by itself a sufficiently adherent and resistant layer, is deposited by cathode disintegration upon the first metal. Hard metals according to the present invention are metals such as Fe, Co, Ni, Mo, W and Cr.

It has been found that such a layer is strongly adherent and has a high mechanical and electrical resistance.

It has been found moreover that the chemical resistance is increased if the metal deposited in the second place is a metal of the precious metals group; Pd, Pt, Ir, Rh, Au, Ag.

Moreover, it is possible to increase the resistance of the layer produced if the dispersion is effected upon a support heated at a high temperature (the support being heated either in a direct or in an indirect manner) and preferably with a high voltage current. It has been ascertained that in this manner the combined layer obtained is analogous to an alloy of the two metals which have been deposited. A combined layer nickel-platinum for instance, has all the advantages of a nickel layer and at the same time is much more passive to oxidation. The same remark applies to layers of cobalt and platinum, of molybdenum and platinum. Excellent results are obtained with chromium and platinum or with chromium and iridium.

It is also possible to apply the present invention to the production of heating plates capable of withstanding a surface temperature of from 350° C. to 450° C., without the necessity of protecting the metal layers. Thanks to the present invention, it will be possible in many cases to use plates, instead of wires, as electric resistances. Whilst a layer of platinum would crack if subjected to an electric current of one watt per

square centimeter of surface, a combined layer of a hard metal and platinum according to the present invention can withstand charges of ten watts per square centimetre, or more.

As a suitable support according to the present invention, use may be made of a substance having a smooth surface, without pores, capable of withstanding high temperatures without breaking or cracking. As substances particularly suitable, the following may be cited: enamel metal plates, quartz which has been molten, certain kinds of enamelled porcelain. In certain cases, where the temperature should not be too high, glass may also be used.

Example of carrying the invention into effect:

A layer of nickel of ten millimicrons is first deposited upon a suitable support by cathode disintegration. A layer of platinum of twenty millimicrons is afterwards deposited upon the first, the support being heated between 200° and 300° C., and the voltage used being 2400 volts.

The layer thus obtained does not dissolve in sulfuric acid, or in hydrochloric acid, nor in concentrated nitric acid and it does not become oxidized, even at high temperatures. Moreover, the said layer is a better conductor of electricity than a layer consisting of the precious metal alone and having the same thickness. The combined layer can be removed from its support with difficulty only, and does not crack easily.

It was not possible so far to obtain well adhering mirrors, silvered mirrors for instance, by cathode disintegration. Thanks to the present invention it is possible to deposit first a layer of nickel or of molybdenum upon a suitable support, and to deposit afterwards a layer of silver; a mirror is thus obtained having a strongly adhering layer of silver.

The layers obtained according to the present invention will be utilized with advantage in all the cases where it is desired to obtain a layer of high mechanical, electrical and/or chemical resistance.

I claim:

1. A process of coating objects having hard, smooth, non-metallic surfaces, which comprises first depositing upon such surfaces by cathode disintegration a layer of a metal selected from the metals of the iron and tungsten groups of the periodic system, and then depositing by cathode disintegration upon said first layer a layer of a different metal which is strongly adherent to the first metal to form a coating having high resistance to injury by chemical, mechanical or electrical influences.

2. A process of coating objects having hard, smooth, non-metallic surfaces, which comprises first depositing upon such surfaces by cathode disintegration a layer of a metal selected from the metals of the iron group of the periodic system, and then depositing by cathode disintegration upon said first layer a layer of a different metal which is strongly adherent to the first metal to form a coating having high resistance to injury by chemical, mechanical or electrical influences.

3. A process of coating objects having hard, smooth, non-metallic surfaces, which comprises first depositing upon such surfaces by cathode disintegration a layer of a metal selected from the metals of the tungsten group of the periodic system, and then depositing by cathode disintegration upon said first layer a layer of a different metal which is strongly adherent to the first metal to form a coating having high resistance to injury by chemical, mechanical or electrical influences.

4. A process of coating objects having hard, smooth, non-metallic surfaces, which comprises first depositing upon such surfaces by cathode disintegration a layer of a metal selected from the metals of the iron and tungsten groups of the periodic system, and then depositing by cathode disintegration upon said first layer a layer of a

precious metal which is strongly adherent to the first metal to form a coating having high resistance to injury by chemical, mechanical or electrical influences.

5. A process of coating objects having hard, smooth, non-metallic surfaces, which comprises first heating said surfaces and depositing on such heated surfaces by cathode disintegration a layer of a metal selected from the metals of the iron and tungsten groups of the periodic system, and then depositing by cathode disintegration upon said first layer a layer of a different metal which is strongly adherent to the first metal to form a coating having high resistance to injury by chemical, mechanical or electrical influences.

6. A process of coating objects having hard, smooth, non-metallic surfaces, which comprises first heating said surfaces and depositing on such heated surfaces by cathode disintegration a layer of a metal selected from the metals of the iron and tungsten groups of the periodic system, and then depositing by cathode disintegration upon said first layer a layer of a precious metal which is strongly adherent to the first metal to form a coating having high resistance to injury by chemical, mechanical or electrical influences.

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