

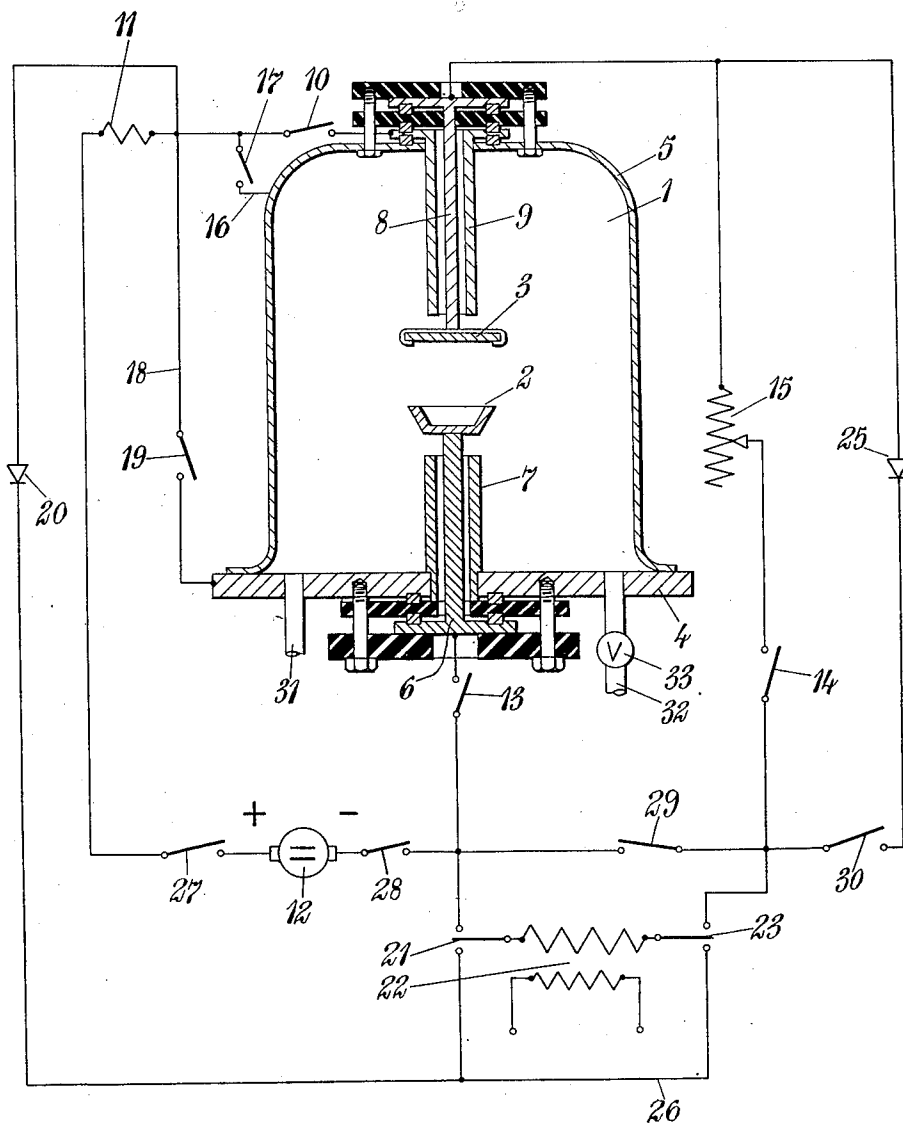
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METALLIZATION OF METAL ARTICLES BY CATHODE DISINTEGRATION

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METALLIZATION OF METAL ARTICLES BY
CATHODE DISINTEGRATIONBernhard Berghaus, Berlin-Lankwitz, and Wil-
helm Burkhardt, Berlin-Grünwald, Germany;
said Burkhardt assignor to said BerghausApplication November 29, 1938, Serial No. 243,012
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1 Claim. (Cl. 250—27.5)

The invention relates to a method of metallizing metal articles by cathode disintegration, and it consists in this that the metal or metal-alloy layer provided by cathode disintegration is wholly or partly diffused into the base metal at high temperature. Preferably, a further metal layer is sprayed on the diffused-in layer at a temperature which lies below the diffusion temperature. The diffusion of the sprayed-on metal layer may be effected in a separate diffusion oven. However, the diffusion may advantageously be effected also during or after the spraying in the cathode disintegration chamber itself. The heating of the metal article to be metallized during the spraying on and the diffusion is preferably effected by glow current heating in the cathode disintegration chamber. For this purpose the metal articles are connected before and during the metallization permanently or temporarily as a cathode. The cathodic spraying on of the metal articles may also be effected in a reducing gas or gas mixture, such as hydrogen or nitrogen and hydrogen mixture.

The metal layers obtained by this method are exceedingly well adhering and resistant and can cope with the stresses. By preliminarily dusting the article in vacuum an absolutely pure surface is obtained which is freed of traces of oxide. The sprayed-on metal, therefore, comes in direct metallic contact which does not only have a favourable influence on the diffusion of the metals within one another, but in many cases is the reason for it being possible. In contradistinction to electrolytically deposited layers which when thermally treated diffuse in only here and there and, owing to the metallic contact not being altogether perfect, which is due to enclosures of the electrolyte, generally form bubbles, the surfaces produced by the method according to the invention show a smooth appearance and an equal depth of diffusion.

The method is suitable for the coating and diffusion of metals or alloys into metal articles of any kind for the purpose of increasing the resistance to wear and corrosion and also for increasing their good appearance.

The invention is illustrated diagrammatically, and by way of example, in the accompanying drawing which shows a section through apparatus for the metallization of metal articles by cathode disintegration provided with a device for heating the article by glow current and with a device for subsequent tempering and controlling means associated therewith.

The apparatus illustrated is more particularly

intended for the coating of metal articles with metal or alloys by cathode disintegration by means of a source 12 of direct current or a source 22 of alternating current used as a source for the disintegration voltage. 1 is the cathode disintegration chamber having a cathode 2 to be disintegrated, 3 being the metal article to be coated. The cathode disintegration chamber comprises a lower part 4 and a removable upper part 5. The cathode holder 6 is mounted in an insulated manner in the lower part 4 and is surrounded at a short distance by a screen 7. The metal holder 8 of the article is mounted in an insulated manner in the upper part 5 and is surrounded at a short distance by a screen 9, which is connected to the positive pole of a source of direct current voltage 12 or a source of rectified current over a switch 10, a protective resistance 11 and a switch 27. The negative pole of the source of direct current voltage may be connected in the desired succession, on the one hand over the switches 28 and 13 to the cathode holder 6 and on the other hand over the switches 29 and 14 and the regulating resistance 15 to the holder 8 of the article. By means of the regulating resistance 15 the glow discharge heating current may be adjusted and, according to the invention, the article may be adjusted to any desired temperature which effects the melting and, if desired, the alloying of the sprayed-on material. Further, the screen 9 of the holder 8 may be connected through the conductor 16 and switch 17 to the wall of the chamber, or through the conductor 18 and switch 19 to the screen 7 of the cathode holder, when required. When a direct current is used switch 30 is open. When a source of alternating current, for instance, a transformer is used as a source of disintegration voltage, the switches 27, 28 and 29 are opened and the switches 14 and 30 are closed. In this case the screen 9 is connected over the switch 10 and a stop valve 20 for the negative alternation over a change-over switch 21 to the one pole of a high voltage alternating current transformer 22. The transformer may be connected with its other pole over a change-over switch 23, a regulating resistance 15 and a stop valve 25 for the negative alternation, connected in parallel therewith, to the holder 8 and thus to the article 3, or to a conductor 26 which leads to the screen 9 of the holder 8 over the stop valve 20 for the negative alternation. By means of the change-over switch 21 the one pole of the transformer may be connected to the cathode holder 6 and thus to the cathode 2 to be disintegrated. The individual switches may be op-

erated in any desired succession. 31 is a pipe which leads to a vacuum pump and 32 is a pipe for a reducing gas, such as hydrogen, or a reducing gas mixture, for instance a mixture of hydrogen and nitrogen, the supply of which can be adjusted by the regulating valve 33.

We claim:

The method of coating metal articles by cathode disintegration within an evacuated chamber having a metallic cathode therein which comprises, impressing a voltage across the cathode

and the article to be coated to create a glow current within the chamber for heating the article and disintegrating metal particles from the cathode onto the article, adjusting said voltage to such a value as to fuse the metal particles into the article being coated, and applying additional metal particles onto coating thus formed at a temperature below the fusion temperature.

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