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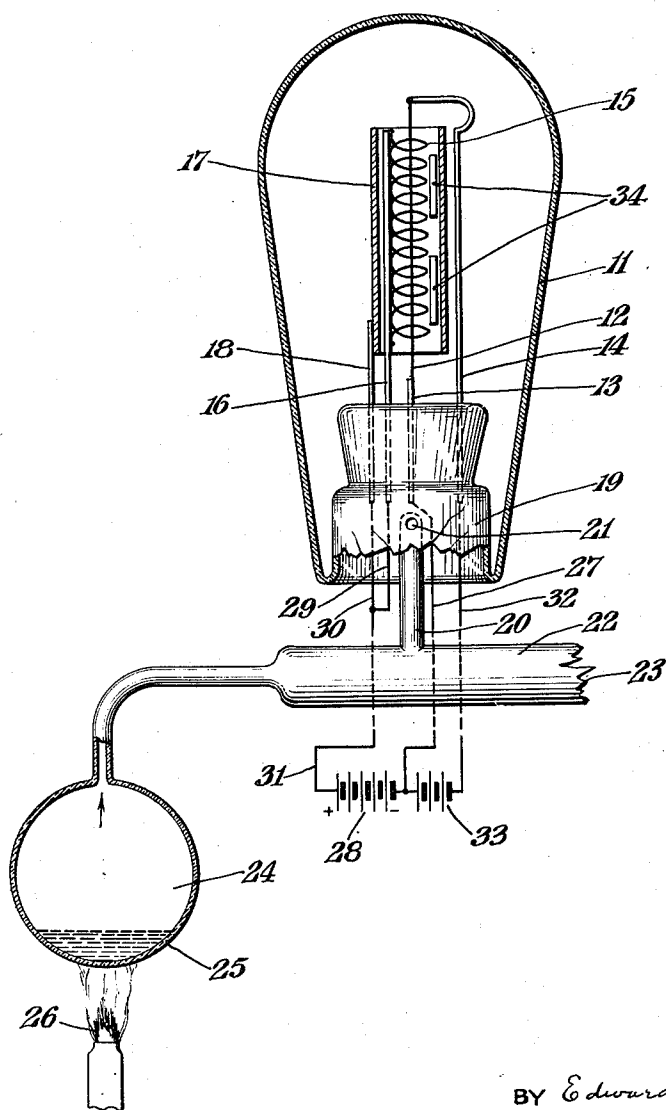
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METHOD OF OBTAINING METALLIC COATINGS

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Fig. 1



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METHOD OF OBTAINING METALLIC COATINGS

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This invention relates to a method of obtaining thin metallic coatings. More specifically it relates to the obtaining of coatings of alkali or alkali-earth metals on electrode surfaces. It is one of the objects of the invention to obtain dense, uniform and tenaciously clinging coatings of the character described in any suitable thickness as may be desired. In order to more clearly explain the invention, reference is made to the following description taken in connection with the accompanying drawing, in which

Fig. 1 is a view partly in elevation and partly in section of a form of apparatus suitable for carrying out the method of the present invention.

The reference character 11 indicates an enclosing glass container or tube for a radio amplifier or detector. There may be positioned within the tube a filament or cathode 12 of some suitable material, such as tungsten, upon which it is desired to place the metallic coating and which may be sustained by supports 13 and 14. Surrounding the filament or cathode 12 there is a grid 15 which is shown in the form of a helix and which is carried by a supporting member 16. Positioned around the filament and grid is an anode or plate 17 carried by a supporting member 18. The lower portion of the tube 11 may be provided with a stem 19 in which the support 14 and supporting members 16 and 18 may be molded or otherwise embedded. A tube 20 may be provided which leads into the stem 19 and has a lateral port 21 connecting with the interior of the tube 11. The outer end of the tube 20 connects with a main duct 22. The end of the duct 22 indicated at 23 may connect with an exhaust pump not shown and other suitable apparatus while the other end of the duct may be connected with a distilling chamber 24 in which the substance 25 to be vaporized is placed. Suitable provision, as a burner 26, may be provided for heating the chamber 24 and vaporizing the substance 25. Among the substances from which a suitable selection may be made may be mentioned organo-metallic compounds of the alkali-earth metals such as

many alkyls, and also alkylhalides of the aliphatic or aromatic group, aryles, etc. Also there may be used some of the acetates, naphtholates, or amids as well as corresponding compounds and substitution products with the various members of the paraffines and olefines which can be obtained by substitution of hydrogen, by substitution of metals, or by addition of the alkali-earth metals to carbon compounds which utilize a double valency bond of the carbon or to free organic radicals.

The support 13 is connected by means of a conductor 27 to the negative side of a battery 28. A conductor 29 from the supporting member 16 of the grid 15 and a conductor 30 from the supporting member 18 of the plate or anode 17 are connected together and through a conductor 31 to the positive terminal of the battery 28. A conductor 32 is connected with the support 14 and a suitable battery 33 for heating the cathode or filament 12 may be connected between the conductors 27 and 32. Pieces of "getter" material 34, such as magnesium or calcium, may be attached to the anode or plate and also serve to hold the anionic products of the gaseous electrolysis.

In operation a vacuum is produced within the tube 11 by drawing out the gases through the end 23. Thereafter the tube is filled with a gaseous compound or compounds of suitable metals such as those of the alkali or alkali-earth group, this action being assisted by heating the chamber 24 by means of the burner 26. The battery 28, by placing a potential difference on the plate and grid on the one side and the filament on the other side, causes gaseous electrolysis to take place and the metal, such as barium, is carried to the cathode and deposited thereon. This action may be accelerated by auxiliary ionization which in this case is produced by the heating of the filament 12 to an incandescent temperature by means of the battery 33. The auxiliary ionization may also be produced by means of an electrode used for ionization which does not serve as the body on which the deposition is desired and which is maintained at a sufficiently high temperature so that no

deposition does take place thereon. The potential placed upon such an auxiliary ionization electrode should be negative with respect to the other electrodes, both anode and cathode.

The above method is not necessarily confined to the use of direct current as alternating current may also be used, although the choice of suitable chemicals is somewhat more restricted and in some instances it may be necessary to remove the halogenides or other generated substances or to prevent them from attacking the deposits on the filament during the periods of current reversal. The pieces of magnesium or calcium besides acting as "getter" materials during the exhausting process also serve to hold the non-metallic products of decomposition.

The foregoing method is particularly adapted for use in the tube itself wherein the deposition or coating takes place on the electrode which is already mounted in position. While a radio tube has been described hereinbefore, by way of example, it is to be understood that various other discharge devices may employ this method and the description of the specific embodiment set forth is not to be considered in the nature of a limitation to the scope of the invention except as so limited in the subjoined claims.

We claim:

1. A method of coating an electrode of a discharge tube with a metal of a class including the alkali and alkali-earth groups comprising introducing a gaseous compound of the metal to be used as a coating into the tube and decomposing said compound by gaseous electrolysis whereby the metal is set free and deposited on the body to be coated.

2. A method of coating an electrode of a discharge tube with metal of a class including the alkali and alkali-earth groups comprising introducing a gaseous compound of the metal to be used as a coating into the tube and imposing an electrical potential between the body to be coated and another electrode positioned in the tube whereby gaseous electrolysis takes place and said metal is deposited on said body.

3. A method according to claim 1, characterized by holding the non-metallic products of the decomposition at the anodes by means of special substances which have a chemical attraction for said products.

4. A method of coating an electrode of a discharge tube which comprises introducing a gaseous compound of a metal to be used as a coating into the tube and decomposing the compound by gaseous electrolysis to set the metal free and deposit it on the body to be coated, and accelerating the action by auxiliary ionization of the gas.

5. A method of coating an electrode of a discharge tube which comprises introducing

a gaseous compound of a metal to be used as a coating into the tube and decomposing said compound by gaseous electrolysis to set the metal free and deposit it on the body to be coated.

6. A method of coating which comprises decomposing by gaseous electrolysis a gaseous compound of the metal to be used as a coating in the presence of the body to be coated whereby the metal is set free and deposited on the body.

7. A method of coating which comprises decomposing by gaseous electrolysis a gaseous compound of the metal to be used as a coating in the presence of the body to be coated whereby the metal is set free and deposited on the body, and holding the non-metallic products of the decomposition at another member which has a chemical attraction for said products.

8. A method of coating which comprises introducing a gaseous compound of the metal to be used as a coating between two bodies, one of which is to be coated, and applying an electrical potential between said bodies to decompose said gases and coat the said body.

9. The method of coating which comprises introducing a gaseous compound of a metal to be used as a coating into the tube, decomposing the compound by gaseous electrolysis to set the metal free and deposit it on the body to be coated, and accelerating the action by heating an auxiliary electrode sufficiently high to cause auxiliary ionization and prevent deposition of metal on said auxiliary electrode.

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