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METHOD OF COATING ARTICLES BY CATHODE DISINTEGRATION
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Fig. 1.

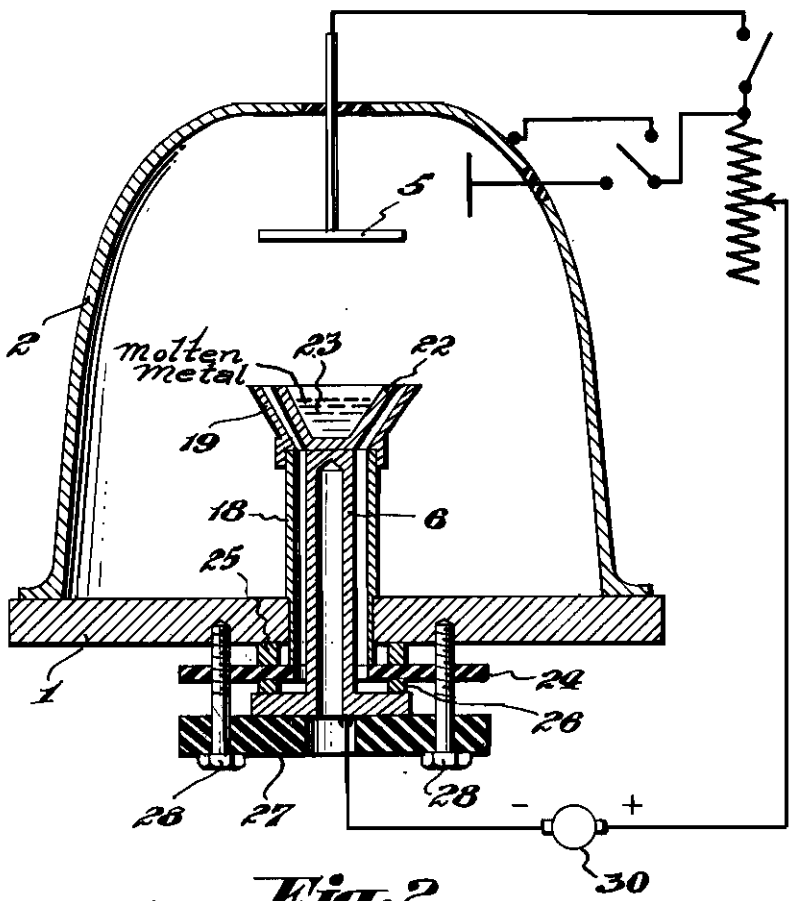
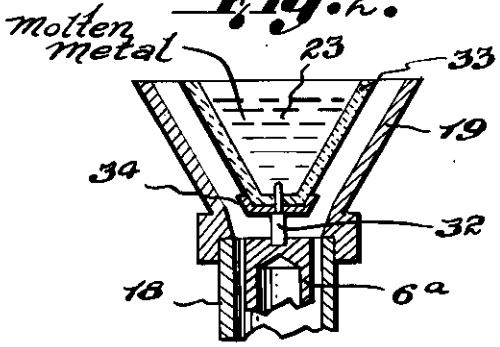



Fig. 2.

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# ALIEN PROPERTY CUSTODIAN

## METHOD OF COATING ARTICLES BY CATHODE DISINTEGRATION

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Application filed August 23, 1939

The present invention relates to a method of coating articles by cathode disintegration wherein the cathode material is disintegrated in a liquid state and this application is a continuation in part of our copending application Serial No. 198,557 filed March 28, 1938.

It is known in cathode disintegration to disintegrate the cathodes in a solid state, for instance, in the form of discs, wires or tape. Owing to the small disintegration speeds thereby obtained cathode disintegration has hitherto received only a limited application. It is also known that an increase in tempertaure of the solid cathode material has no substantial influence on the amount of material disintegrated.

However, it has been found that, from the melting point of the cathode material onwards, the amount disintegrated per unit of time increases surprisingly. The following results show the differences in the amounts of the disintegration as between solid and liquid cathode material.

| | Time in minutes | Watts | Disintegrated amount in mg. |
|---|---|---|---|
| Solid cadmium | 5 | 17.0 | 183.00 |
| Liquid cadmium | 5 | 154.0 | 16500.00 |
| Solid silver | 3 | 38.5 | 2.40 |
| Liquid silver | 3 | 77.0 | 160.00 |

In this comparison the surface areas of the solid and liquid material were equal. As compared with the increase in output it is found that the amount of material disintegrated increases, not only in proportion with the output but greatly beyond it. It has been further ascertained that by increasing the temperature of the molten cathode material the yield is increased.

When the cathode material is disintegrated in a molten state from a metallic crucible care must be taken that the material to be disintegrated does not form a compound with the material of the crucible. Cadmium, silver and copper have, for instance, been fused and disintegrated in a molybdenum or tungsten crucible. Other metals with a higher melting point, such as nickel, cobalt, chromium, vanadium, platinum, titanium, rhodium and the like, which readily form an alloy with other metals, may be disintegrated in non-metallic crucibles such as sintered alumina, beryllium oxide, magnesium oxide, aluminium oxide, zirconium oxide and the like.

Two forms of apparatus are illustrated by way of example in the drawings for carrying out the invention in which:

Fig. 1 is a section through cathode disintegrating apparatus, taken through the cathode and crucible; and

Fig. 2 is a cross-section through the cathode having a non-metallic crucible.

Referring to Figure 1, the side wall of the cathode disintegration vessel is represented at **2** and the chamber is sealed by means of a bottom plate **1**. The cathode is preferably made of crucible shape, for instance, a metallic crucible **22** formed of molybdenum which is carried by the supporting member **6**. A metal covering **18** is provided to embrace the supporting member in a spaced relation and a cap **19** surrounds the crucible. These two parts are arranged at a small distance from the supporting member **6** and from the metal crucible **22** respectively. The metal to be disintegrated is represented at **23** which is placed in the crucible **22**. The supporting member **6** is insulated from the housing by an insulating disc **24** and an insulating ring **27** is employed for pressing the flange of the supporting member against the sealing ring **26**. The disc **24** is also pressed against the lead sealing ring **25**.

In carrying out the invention the cathode material is first arranged in the crucible **22** in the solid state and the housing is sealed and evacuated. Gas such as argon, hydrogen, nitrogen or helium may be introduced into the chamber to provide a pressure therein for permitting cathode disintegration to take place and this pressure must be between 5 and 0.001 millimeters of mercury. The cathode material is then melted by ionizing the gas within the housing and an ionic current of a glow discharge is created between the cathode material and the article **5** to be coated, or an anode. The voltage source for providing the glow discharge is represented at **30** in Fig. 1 with the negative terminal connected to the cathode support **6** and the positive terminal connected to the article to be coated, or an anode, for instance the wall of the apparatus.

The ion bombardment thus crated in the housing heats the cathode material to the molten or liquid state. Disintegration of the cathode may take place before the material in the crucible becomes entirely molten. When the cathode ma-

terial is melted however the amount of material disintegrated from the cathode increases so that the article is more rapidly coated than when the cathode remains in the solid state.

The construction shown in Fig. 2 differs from the arrangement shown in Fig. 1 merely by the fact that a metal pin 32 is provided on the cathode support 6a, which metal pin is inserted through a hole in the bottom of the non-metallic crucible 33, and the crucible is supported by means of a saucer-like member 34. The metal saucer 34 is arranged in a spaced relation from the end surface of the cathode support 6a, so that the transmission of heat to the cathode support shall be as small as possible. The covering 18 and the cap 19 serve as an insulation in the same manner as in the arrangement hereinabove described.

Disintegration crucibles according to the invention as above described may also be mounted in a large number in the bottom of a disintegrated chamber, in order to provide articles having large surfaces, such as metal sheets, with a protecting coating. The shape of the crucible or crucibles may be adapted to conform to the article to be covered, so that a uniform coating is obtained.

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