

UNITED STATES PATENT OFFICE

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PROCESS OF PRODUCING PROTECTIVE METAL COATINGS

No Drawing.

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This invention relates to processes for producing protective coatings, or to protective and resistant coatings, and aims to provide improvements therein.

Steel and other foundation metals, when plated with protective coatings such as copper, zinc, silver, lead, nickel, cobalt, chromium, molybdenum, tungsten, tantalum, titanium, platinum, gold, etc., or when plated with metals which are both protective and resistant, such as lead, nickel, cobalt, chromium, molybdenum, tungsten, tantalum, titanium, platinum, gold, etc., at least unless the plates are relatively thick, show attack when subjected to the action or influences of the air, sea-air, and acids. This is due in all probability to defects in the plating appearing as surface cracks, and also to imperfections, called "pin-holes", where the foundation metal is covered with an adherent gas-bubble of some kind and the protective or protective and resistant metal is thereby prevented from depositing on the foundation metal at this point. Test-pieces of steel having a plate of a protective or of a protective and resistant metal thereon, when dipped in salt water and hung up over night, show extensive discoloration.

The invention provides a process for producing a coating or plate of a protective metal such as copper, zinc, silver, lead, nickel, cobalt, chromium, molybdenum, tungsten, tantalum, titanium, platinum, gold, etc., or of a metal which is both protective and resistant, such as lead, nickel, cobalt, chromium, molybdenum, tungsten, tantalum, titanium, platinum, gold, etc., or of such a metal with another metal applied thereon, which protects the underlying foundation metal from the action of atmospheric influences, sea-air, or acids, or from several or all of these agents, according as the coating is protective or protective and resistant.

The invention further provides a process for producing a coating of the character described having a bright or metallic lustre.

According to the present invention, metal (or alloy articles (steel for example) are plated with a protective, or a protective and resistant metal, such as above set forth, ac-

ording to any suitable method of plating, and then treated to eliminate or heal the cracks and "pin-holes" therein.

The article having the electroplate of metal thereon is subjected to any suitable form of mechanical treatment for spreading the plate over the uncovered holes, or otherwise defective portions, in the plate. This spreading may be produced by the action of an abrasive applied in a suitable manner, as upon a wheel, or in a blast, or by the impingement of bodies having a hammering or upsetting action on the particles or crystals of the surface, or by rubbing of the articles, as by tumbling.

The plates, treated as described, are in addition provided with a coating of the same, or of another metal, applied in a suitable manner, as by electroplating, dipping, etc.

Such coatings comprising two electrolytic coatings are bright (metallic lustre) in those cases where the deposit of the second metal is bright, as for example in the case of chromium, or may readily be made bright, as in the case of copper, zinc, silver, nickel, gold, tantalum, tungsten, and platinum, which are more or less susceptible to finishing by buffing, burnishing, etc., and are protective against attack on the foundation metal by atmospheric agents, and protective and resistant in the case of the resistant metals against attack by sea-air, and acids, on the coating and on the foundation metal.

In applying the second coat by electrodeposition, in the case of the resistant metals, such as lead, nickel, cobalt, chromium, molybdenum, tungsten, tantalum, titanium, platinum, gold, etc., and particularly where the underlying coat is one of the highly resistant metals, such as chromium, tungsten, tantalum, or platinum, the pin-hole defects in the second coat will be of no practical disadvantage, as the underlying coat will be intact, and in any event the defects in the second coat will not coincide with the defects, or loci of the defects, in the first place, as the conditions giving rise to the pin-holes or defects in the first plate will have been changed by the treatment preceding the second coat.

Chromium, by reason of its relative abundance and unusual resistivity to most acids,

has a special value as a protective and resistant coating. The first coat may be chromium electroplated on the foundation by a suitable process, as for example, set forth in Fink Patent No. 1,581,188, dated April 20, 1926.

5 This coat is then treated to eliminate cracks "pin-hole" defects, as by rubbing or abrading on an emery wheel. This removes some of the plate incidentally but draws or pulls the
10 metal on the surface so as to spread adjacent portions over defective portions of the plate. This treatment in itself may be carried to the extent of completely healing or eliminating the pin-holes or other defects in the plate,
15 or may be carried to the extent of providing a new character or surface for the second coating or plate, so that the conditions inducing defects in the first plate will be changed in depositing the second plate.

20 A second plate of chromium is conveniently provided by electroplating, the conditions being so controlled, as set forth in application Serial No. 57,290, September 19, 1925, now Patent #1,802,463, to produce a mirror,
25 bright, satin, or dull plate.

What is claimed is:

1. A process of producing protective coatings comprising electrodepositing a plate of one of the herein-described resistant metals,
30 mechanically treating to heal or eliminate pin-holes, and coating with a second coat of metal.

2. The process of producing resistant coatings, comprising electroplating a chromium
35 plate on an article, and mechanically treating said plated surface to eliminate pin-holes therein, and applying a second coat of metal thereon.

3. The process of producing resistant
40 coatings, comprising electroplating a chromium plate on an article, and mechanically treating said plated surface to eliminate pin-holes therein, and electroplating a second plate of metal thereon.

45 In witness whereof, we have hereunto signed our names.

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