UNITED STATES PATENT OFFICE.

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COLORING METALS.

1,023,291. Specification of Letters Patent. Patented Apr. 16, 1912.

No Drawing. Application filed December 16, 1908. Serial No. 467,802.

To all whom it may concern:

Be it known that I, SALOMON AXELROD, a subject of the Czar of Russia, residing at Oberschöneweide, Germany, have invented certain new and useful Improvements in Coloring Metals, of which the following is a specification.

When aluminium oxid is heated with cobalt salts, there is obtained a dark blue mass of cobalt ultra-marine or Thenard's blue. Zinc oxid, in the same manner, results in the so-called Rinman's green. Tin oxid is colored blue-green and magnesium oxid flesh-color. I find that if this reaction is carried out on a clean metallic surface of the above metals, the same colors are obtained by gently heating the metals, but which become dark when the temperature is raised, merging from brown into steel gray. If an oxid coating is previously produced upon the surface of the above metals, by means of gently heating them, or by the use of acids, the brown or black color, produced by the use of cobalt salts, will readily appear by gently heating. If the treatment with cobalt salts, and the consequent heating is repeated several times, the surface assumes a black color. The black coating thus produced adheres firmly to the metal and protects it from corrosion.

According to my present knowledge, the reactions here taking place are as follows: The originally formed combination of the metallic oxid and the cobalt salt, which, in all probability, consists of a double salt of the specific metal with the cobalt salt, unites with an excess of cobalt salt, and using for example, cobaltous nitrate, the resulting compound has a steel gray color, often with a metallic luster, and it probably has been transformed into a sesquioxid of cobalt. This in turn is transformed by a stronger heating to the cobaltous-cobalic oxid. In this manner, it is possible to produce brown, steel-gray, and black colorations upon the surface of the specific metal by varying the heating temperature and the excess of cobalt salt.

The manner of carrying out the foregoing procedure is as follows: The object to be treated, either with previous warming or while cold, is dipped into a neutral or alkaline solution of cobalt salt, such as cobaltous nitrate, and is subsequently gently, or more strongly heated according to the shade desired. If desired, the solution also may be painted on with a soft brush. The degree of temperature and the number of immersions are determined entirely by the shade desired.

It is true that processes are known for producing a brown color upon aluminium, as by heating the metal after it has been provided with a coating of fresh white-of-egg, but the coating produced in this manner can be removed by energetic rubbing. According to the different procedure described by Dr. Götting, a brown color is produced upon aluminium by etching the metal, whereby the silicon and iron in the commercial aluminium are brought out and produce a surface coloration. This gives the aluminium not a black, but a brownish color.

The progress caused by the present invention lies chiefly in the fact that the metal is given a surface, not consisting of some superficial carbonaceous material, but a permanent dead-black metallic coating firmly adherent to the surface.

The present process also can be carried out relatively more cheaply and rapidly than processes used heretofore.

Although I have described my invention with reference more particularly to aluminium, I desire it to be understood that other metals such as zinc, tin, magnesium, and their alloys, and in fact any metals forming colored compounds with cobalt salts may be treated in a similar manner, in order to produce the above-described surface colorations.

I also mean by the appended claims to include the treatment of aluminium or other metal surfaces which have a surface film of oxid.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. The process of producing a coating upon metals which consists in providing the metals with a surface coating of cobalt salt and subsequently heating the metals more or less strongly according to the shade desired.

2. The process of producing a brown to black surface coloration upon aluminium which consists in providing the aluminium with a surface coating of a cobalt compound, heating the metal, and repeating this process according to the shade desired.

3. The process of surface-coloring metals which consists in applying upon the metals

a neutral solution of cobalt salts and heating the same more or less strongly according to the shade desired.

4. The process of surface-coloring metal which consists in applying upon the surface of a metal, a coating of a cobalt compound and then heating the metal more or less strongly according to the shade of color desired.

5. An aluminium article having a surface coating, chemically combined therewith, of an adherent cobalt compound.

6. A metallic article having a cobalt compound chemically combined with its surface.

7. A metallic article having a black cobalt compound chemically combined with its surface.

8. An aluminium article having on its surface, chemically combined therewith, a black adherent compound of aluminium and cobalt.

In witness whereof, I have hereunto set my hand this 24th day of November, 1908.

SALOMON AXELROD.

Witnesses:
HARL BREKELEEN,
ALFRED WOLF.