

UNITED STATES PATENT OFFICE.

EMANUEL GOLDBERG, OF MOSCOW, RUSSIA.

ELECTROLYTICALLY COATING IRON WITH ZINC.

SPECIFICATION forming part of Letters Patent No. 733,028, dated July 7, 1903.

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To all whom it may concern:

Be it known that I, EMANUEL GOLDBERG, chemist, a subject of the Russian Emperor, residing at 32 Miasnitskaia, Moscow, Russia, have invented a certain new and useful Improvement in Electrolytically Coating Iron with Zinc; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved process for electrolytically coating iron with zinc, the improvement consisting in adding to the electrolyte used an organic compound containing nitrogen.

The known methods for electrolytically coating iron with zinc have not given satisfactory results, as the metal coating obtained in this manner either is deposited in a form which is not white or adheres badly to the surface to be electroplated. By the present invention, however, a pure white coating of zinc which adheres well to the surface of the iron.

My invention for this purpose consists in adding to the electrolyte wherein the iron is to be coated a compound containing nitrogen bound to an organic radical, examples of which nitrogen compound are given below.

My invention also consists in such further features, steps, and methods as will be hereinafter pointed out.

Suitable compounds for my invention are amines, amides, cyanides, nitriles, or like compounds in which the nitrogen is attached directly or indirectly to an organic radical. The pyridin bases have given the best results.

The process is illustrated by the following example:

An electrolytic bath is prepared by dissolving ten grams of zinc chlorid and ten cubic centimeters of pyridin in about one liter of water and adding enough hydrochloric acid to dissolve the double salt of zinc chlorid and pyridin which is formed. To separate the zinc electrolytically from this bath, a current not exceeding 0.2 ampere per square decimeter is required. As anode is used zinc and as cathode the iron object to be coated with zinc, which must be freed from fat and oxid,

When the concentration of the bath is increased, the maximum current density used may be increased.

Thus far I have not been able to accurately determine the chemical reasons for the industrial advantages which result from the employment of the class of compounds in which a nitrogen compound is bound to an organic radical. However, it seems that when carrying out my process the zinc is at an intermediate stage combined with the organic compounds, or there is formed an intermediate double compound of zinc chlorid with an organic base, to which is due a more extensive decomposition and a more copious separation of zinc, supplying a zinc precipitate, which forms a very strongly-adhering coating.

A simple experiment will show that when coating an object with zinc with a one-percent. solution of zinc chlorid and employing the current densities which are permissible in the art a black spongy deposit is formed. If, however, one of the nitrogen compounds set forth in this description is added to the zinc salt in accordance with my invention, a pure white, dense, and in many cases even a shining and bright deposit of zinc is obtained.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

1. The process of electrolytically coating iron, which consists in passing an electric current through the iron as a cathode in the presence of a zinc anode and an electrolyte containing a compound having nitrogen bound to an organic radical.

2. The process of coating iron electrolytically, which consists in forming a bath containing a zinc compound combined with a compound having nitrogen bound to an organic radical and introducing the iron into the bath and passing the electric current through the same in the presence of a zinc anode.

In testimony whereof I have affixed my signature in presence of two witnesses.

EMANUEL GOLDBERG.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.