

UNITED STATES PATENT OFFICE.

SHERARD COWPER-COLES, OF LONDON, ENGLAND, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SHERARDIZING SYNDICATE, LIMITED, OF WESTMINSTER, LONDON, ENGLAND, A CORPORATION OF GREAT BRITAIN.

PROCESS OF DEPOSITING METALS ON METALLIC SURFACES AND THE PRODUCT THEREOF.

SPECIFICATION forming part of Letters Patent No. 701,298, dated June 3, 1902.

Application filed July 24, 1901. Serial No. 69,587. (No specimens.)

To all whom it may concern:

Be it known that I, SHERARD COWPER-COLES, electrometallurgist, of 46 Morpeth Mansions, Morpeth Terrace, Westminster, London, England, have invented certain new and useful Improvements in the Process of Depositing a Metal on Metallic Surfaces and the Product Thereof, of which the following is a specification.

10 This invention relates to a process of depositing zinc or equivalent metal on iron or steel, thus protecting the surface of the latter from the effects of oxidation or similar corrosive agencies. It relates also to the product of this process—that is, a metallic object having its surface coated with such deposit. By this method the iron or steel acted on has formed on it a thin homogeneous covering of zinc, rendering it non-corrodible.

20 Hitherto the most successful results with regard to the deposition of zinc on iron or steel have been achieved either by dipping the metal to be coated in a bath of molten zinc, usually known as the “hot” galvanizing method, or depositing the zinc electrolytically, generally known as the “cold” galvanizing method. In the former case there are two principal disadvantages—namely, the difficulty of regulating the depth and even distribution of the deposit and the deleterious effect of the heat of the bath on the metal being coated. In the case of the electrolytic process the deposition can be better regulated and the temper of the metal is unaffected, so that this latter process is undoubtedly well adapted for certain articles, such as tubes; but is not easily applicable to large masses of metal, such as castings, or to articles of intricate form.

40 By my process the thickness and evenness of the deposit can be regulated as desired, and any description or shape of iron or steel can be satisfactorily and economically dealt with.

45 This invention will be explained with reference to the coating of small articles—such as screws, bolts, and the like—from which its application to other and larger masses of metal can be well understood. The description refers to the deposition of zinc on iron and steel;

but this invention is not limited to these metals. For example, zinc may be deposited on brass or copper, or a zinc alloy may be used in place of zinc alone.

55 The surfaces of the articles to be coated are preferably first cleansed by any well-known process, such as pickling or by the sand-blast, and are then placed in a metal-receptacle; preferably of iron or steel, and covered with “zinc-dust.” The air should be excluded as much as possible, and for this reason a closed receptacle is generally preferable. This receptacle or box is then submitted to the action of heat (about the dull-red heat of iron is sufficient) for half an hour to an hour, depending on the thickness of deposit required. This receptacle is then allowed to cool and the articles withdrawn, when they will be found to have deposited on their surfaces a smooth tough adherent coating of zinc. The remainder of zinc-dust employed may be used again, and if the air has been excluded, as previously referred to, the loss of efficiency is very small. Under certain circumstances we may use a higher temperature, which appears to cause the deposit to penetrate more deeply.

80 What is commercially known as “zinc-dust” contains some oxid of zinc—about ten per cent.

85 If metallic zinc in the form of powder or pulverulent zinc is employed, a certain proportion of the oxid of zinc must be present to produce the result. This can be effected by adding oxid of zinc or submitting the metallic zinc to oxidizing influences.

90 It is well known that zinc-dust will not melt at high temperatures; but I have discovered a method of obtaining a deposit of metallic zinc from it, as described.

95 In some cases a small percentage of carbon (by way of example three per cent.) intimately mixed with the zinc-dust results in a finer and more homogeneous deposit being obtained, owing, it is believed, to the combination of the carbon with the oxygen of the air, thus reducing the probability of too great an oxidation of the zinc in the zinc-dust. I have found that the addition of three per cent. of powdered carbon gives satisfactory 100

results. The temperature and the amount of carbon can be varied, the above example being merely typical. A convenient way of doing this is mixing a little hydrocarbon, such as vaseline or grease, with the zinc-dust, as this makes the application in certain cases more easy and economical.

The deposit on the iron or steel can be formed of more or less thickness, according to the length of time during which the zinc-dust is allowed to act on it. If the zinc deposit so formed be removed by any mechanical means, such as filing or chipping, the surface of the iron exposed is still unaffected by corrosion.

This invention will be found very useful for protecting the surface of silver and the like from the effects of corrosive agencies, such as sulfureted hydrogen. The silver or other metal is subjected to the same process as that already described in the case of iron or steel.

The utility of the process as applied to silver is that a film of zinc is deposited on the surface of the silver, and so prevents the silver being affected by the sulfur and other impurities in the atmosphere, and so tarnishing.

Metallic surfaces covered with zinc according to this invention have the following characteristics: The deposit of zinc is homogeneous and in this respect is different from hot galvanizing. In appearance it also differs from galvanized iron or steel, and this difference of appearance is due to difference of structure. In the case of this invention the zinc deposit appears to be free from crystalline formation. Moreover, the application of the process has the effect of imparting a delicate silver-gray tint to the article treated. Under the microscope enlarging to fifty diameters the difference between samples made according to this process and those made according to ordinary galvanizing processes is very marked both in structure and formation. In the latter case the coating is distinctly crystalline and in the former it is apparently not so.

What I claim, and desire to secure by Letters Patent, is—

1. The process of depositing zinc on metallic surfaces which process consists in applying to the metallic surface pulverulent zinc partially oxidized and in submitting the same to heat.

2. The process of depositing zinc on metallic surfaces which process consists in applying to the metallic surface pulverulent zinc partially oxidized and in submitting the same to heat in a closed chamber.

3. The process of depositing zinc on metallic surfaces which process consists in applying to the metallic surface pulverulent zinc partially oxidized and submitting the same to heat in the presence of carbon.

4. The process of depositing zinc on metallic surfaces which process consists in applying to the metallic surface what is known in commerce as zinc-dust and in submitting the same to heat.

5. The process of depositing zinc on iron surfaces which process consists in applying to the iron surface zinc-dust and in submitting the same to heat.

6. The process of depositing zinc on metallic surfaces which process consists in applying to the metallic surface pulverulent zinc containing not less than eight per cent. zinc oxid and in submitting the same to heat.

7. The process of depositing zinc on metallic surfaces which process consists in applying to the metallic surface pulverulent zinc containing not less than eight per cent. zinc oxid and in submitting the same to heat in a closed chamber.

8. The process of depositing zinc on metallic surfaces which process consists in applying to the metallic surface pulverulent zinc containing not less than eight per cent. zinc oxid and submitting the same to heat in the presence of a small percentage of carbon.

9. As a new product a metallic object with its surface covered with zinc having the following characteristics, a homogeneous coating of zinc, having a physical connection with the metal underneath, and having the appearance to the naked eye of a delicate silver gray and not shiny like galvanized articles and having the distinguishing appearance under the microscope of homogeneous particles free from crystalline structure.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

SHERARD COWPER-COLES.

Witnesses:

ROBERT W. SPEARPOINT,
JOHN D. VENN.