UNITED STATES PATENT OFFICE.

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PROCESS FOR OBTAINING ADHESIVE COATINGS OF COPPER UPON IRON AND STEEL.

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To all whom it may concern:

Be it known that I, SHERARD OSBORN COWPER-COLES, a subject of the King of Great Britain, residing at 1 and 2 Old Pye street, Westminster, London, England, have invented a new and useful Improved Process for Obtaining Adhesive Coatings of Copper upon Iron and Steel; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved process for obtaining adhesive deposits of copper upon iron and steel.

According to my invention I obtain an adhesive deposit of copper upon iron or steel by first rendering the surface passive say by subjecting the metal, after it has been cleansed, to the action of concentrated nitric acid, chromic acid, or potassium hydroxid or by making it the anode in a suitable electrolyte or by any other well-known method, the metal so treated being then at once removed to an electro copper depositing tank to receive the desired coating of copper. I have found that copper thus deposited upon the surface of iron or steel, rendered passive by the preliminary action of nitric acid, is so adherent that it cannot be removed by ordinary mechanical means, the two metals being entirely welded together.

Referring to my use of the term "passive" it may be stated, that passivity is a phenomenon occurring among certain metals that possess the power of assuming a different state, after certain chemical treatment, their anodic properties being altered.

In carrying out my invention I advantageously proceed as follows:—The iron or steel to be coated is first thoroughly cleansed by pickling or sand blasting, after which it is washed in running water and dipped in a concentrated solution of nitric acid. As soon as the evolution of gas bubbles on the surface of the iron or steel ceases, which usually is in about half-a-minute, the metal is removed from the acid and washed preferably in running water. It is then transferred to an electro copper depositing tank the anode and cathode of which have been already connected up in the electric circuit prior to the introduction of the passive metal, so that the latter is immediately coated with copper on its immersion.

The electrolyte in the copper depositing tank may be composed as follows: 10 ounces of cyanid of potassium are dissolved in 80 ounces of water, the solution being then heated to nearly boiling point and 6 ounces of copper sulfite being added gradually under constant stirring. The temperature is then raised to boiling point, and the solution is allowed to cool, after which it is filtered and 80 ounces of water added. Or the electrolyte may be composed of potassium cyanid having copper carbonate dissolved in it, sodium bisulfite being added to the solution. The solution thus prepared is used at a temperature of about 60° C. with a current density of about 3 amperes per square foot of cathode surface. When the steel or iron has received a coating of copper in the depositing tank it is removed, thoroughly washed, preferably with hot water, and immediately transferred to a copper sulfate depositing tank in which it is allowed to remain until the copper coating has obtained the desired thickness.

By my process I am able to obtain deposits of copper upon iron and steel which are so adhesive that they cannot be separated by ordinary mechanical means, so that the process can be employed as a cold welding process in cases in which it is desired to firmly unite or weld copper to iron or steel surfaces.

Claims.

1. A process for obtaining an adhesive coating of copper upon iron or steel which consists in first rendering the surface of the said iron or steel passive and then depositing the coating of copper thereon.

2. A process for obtaining an adhesive coating of copper upon iron or steel, which consists in first cleansing the metal to be coated, then rendering the surface of said metal passive and then depositing the coating of copper thereon.

3. A process for obtaining an adhesive

coating of copper upon iron or steel which consists in first rendering the surface of the metal to be coated passive, by immersion in a concentrated solution of nitric acid, then electrolytically depositing copper upon the metal, from an alkaline, copper containing solution, and then electrolytically depositing copper upon the metal, from an acid, copper containing solution.

SHERARD OSBORN COWPER-COLES.

Witnesses:
JOHN E. BOUSFIELD,
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