UNITED STATES PATENT OFFICE.

EBENEZER G. POMEROY, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN COATING IRON WITH COPPER OR ITS ALLOY.

Specification forming part of Letters Patent No. **7,005**, dated January 8, 1850; antedated July 9, 1849.

To all whom it may concern:

Be it known that I, EBENEZER G. POMEROY, of the city and county of St. Louis, and State of Missouri, United States of America, have discovered a new and useful Process of Coating Iron with Fused Copper, or an Alloy of Copper and Zinc, which is described as follows:

To cover iron with copper or any alloy of which copper forms a part:

Process No. 1.—Immerse the iron (no matter as to its shape or form) in dilute sulphuric acid, or any other acid that will produce the desired effect of cleansing the surface, and when thus cleansed dry the iron over a brisk heat, and when dry immerse it in a mixture of clay and water—say a thin pulp—a sufficient amount of clay to leave a thin coating on the surface when dry. Then dry the iron again over a brisk fire, as before, and it will be in a proper condition for process No. 2.

No. 2.—It will now be necessary to have a suitable bath of melted metal—copper, or its alloys—of a sufficient depth to cover the material to be coated in the form of a furnace, and one that will be susceptible of retaining a sufficient heat to hold the copper in a thin lively fluid state, or a receiver if the copper is melted by a cupola or other furnace capable of keeping the melted metal, as above described, hot and lively. The exact temperature I have never ascertained by a thermometer, nor do I think it by any means necessary—that is, the degree of heat—in order for the copper to form a union with the iron, for if the copper be thin and lively it will unite with great facility with a large range of heat or temperature given by a thermometer.

No. 3.—The length of time required for the iron and copper to form a union will be according to the thickness of the iron. Iron No. 26 in sheets will not bear to remain in the bath over a few seconds, and for this reason so soon as it has become impregnated with the melted metal in the bath it becomes "hot short," and will break by its own weight; but handle it carefully, as above described, and as soon as it is cold, it will become tough. You then pass it through rollers as often as it is necessary to produce the desired thickness. The result of this annealing process will be a smooth surface fully equal to the brightness of pure copper or brass.

The time required to coat the iron will generally be proportioned to the massiveness of the piece—that is, it will depend on the time necessary to bring up the temperature of the iron to the point of alloying with copper. When in a fluid state, the copper is in a condition to commence coating the clean iron, and will do so if the piece of iron be not so large as to reduce the copper around it to the pasty or solid form. If the heat of the copper be much above the bare melting-point thick pieces of iron will be the sooner raised to the required temperature and coated with the copper. In the first dipping let the iron remain in the bath so long as it will bear without becoming hot-short, for (observe) the more the copper penetrates the iron upon the first dip the greater will be its toughness and strength, and if it be desired to increase the thickness of the coating you may make dips in quick succession. This will of course increase the coating upon the surface.

The usefulness of clay as a coating to defend the surface of the iron from oxidation, after cleansing it depends in part upon the union formed between the acid and the ammonia generally found in clays, which takes to itself the residual sulphuric acid, and thus prevents its slow action on the iron while the clay mechanically protects the surface from the action of the air.

To be effectually defended by the copper the iron ought to be thoroughly coated, since if any point of iron be left exposed it will be corroded only the more rapidly on account of being in contact with the less oxidable metal which is to it an electro-negative, just as iron imperfectly tinned is found to corrode faster at the naked parts than if no tin had been applied to it. This copper-coated iron will be found useful for many purposes and appliances. It will be found useful in the sheathing of vessels, in the roofing of houses, and in steam-boilers for steamers. The saving will be great in the fastenings of ships, inasmuch as a spike made of iron is much stronger than one made of copper; but when covered by this

process with copper will prevent the action of the gallic acid of the wood upon the iron.

Having thus fully described my process of coating and impregnating iron and other metals with copper, &c., what I claim as my invention or discovery, and desire to secure by Letters Patent, is—

1. The before-described process of coating and impregnating iron in all useful shapes and forms with copper or any alloy of which copper forms a part, the said process consisting of cleansing with sulphuric acid, defending the cleansed surface with a coating of clay or other aluminous earth, drying the same, and then plunging the article thus coated into melted copper or some alloy of that metal.

2. The use of the clay-paste to protect the metal from oxidating during the process of alloying or coating the metal plates or pieces of iron, as set forth herein.

In testimony whereof I have hereunto signed my name before two witnesses.

E. G. POMEROY.

Witnesses:

WM. P. ELLIOT,

LIND WASHINGTON, Sr.