UNITED STATES PATENT OFFICE.

PIERRE HENRY BERTRAND, OF PARIS, FRANCE.

PROCESS OF COATING IRON WITH MAGNETIC OXIDE.

SPECIFICATION forming part of Letters Patent No. 510,318, dated December 5, 1893.

Application filed February 28, 1893. Serial No. 464,100. (No specimens.) Patented in France February 21, 1891, No. 211,583; in England June 15, 1891, No. 10,144; in Germany June 16, 1891, No. 62,431, and in Austria-Hungary October 19, 1891, No. 2,097 and No. 21,518.

To all whom it may concern:

Be it known that I, PIERRE HENRY BERTRAND, of Paris, France, have invented a new and useful Process of Coating Iron and Steel Articles with Magnetic Oxides of Iron, which is fully described in the following specification.

My invention has been patented in a limited form in the following named Letters-Patent in other countries, to wit: France, dated February 21, 1891, No. 211,583; England, dated June 15, 1891, No. 10,144; Germany, dated June 16, 1891, No. 62,431, and Austria-Hungary, dated October 19, 1891, No. 2,097 and No. 21,518.

This invention has for its object the formation upon articles of wrought and cast iron and steel of a coating of magnetic oxide (Fe_3O_4), which, as is well known, preserves the article from rust. The new process whereby I produce this coating of magnetic oxide consists in depositing upon the iron or steel body under treatment a thin layer or covering of some metal or alloy which will volatilize at a temperature below that which would deform the body of article to be coated, and then heating the article provided with such covering in any ordinary or convenient furnace until the article is heated sufficiently to form thereon a coating of magnetic oxide and the covering of the metal or alloy is volatilized.

In the practical use of the process I have found that a temperature of 1,000° centigrade properly accomplishes the desired result, but I do not wish to be limited thereto, because the temperature required will depend upon the form, size and composition of the article and the volatilizability of the covering metal or alloy. When so heated the iron or steel will oxidize, notwithstanding the presence of the metallic covering, but the presence of the covering will not permit the access of oxygen in sufficient quantity to form the destructive sesquioxide or red oxide of iron, the quantity of oxygen penetrating the metallic covering being only sufficient to form a firm, permanent coating of protective magnetic, or black oxide.

The advantage of using a metal or alloy volatilizing at a comparatively low temperature is that, while the magnetic oxide is forming, the said metal or alloy is being driven off by the heat, leaving only the coating of oxide, which in the course of a few minutes after the article has reached the proper temperature, will coat it uniformly.

I have obtained successful results in the coating of pipes, cooking utensils, &c., by leaving them in a furnace exposed to a heat of about 1,000° centigrade for a period of about ten minutes.

The metallic covering may be applied to the article in various ways, such as chemically, by precipitation from a solution of metallic salts; or physically, by buffing or rubbing with metallic brushes composed of copper or other such volatilizable metal or alloy; or electrically by electrolysis. The covering however, may be applied in any known or efficient manner, the essential feature of my invention being the formation of a coating of magnetic oxide upon iron or steel bodies previously covered with a thin layer of a more easily volatilized metal, and not the particular method of applying such layer. Copper, tin, or an alloy of copper and tin, or any suitable metal or alloy may be used to form the temporary or volatilizable covering. It will be understood that grease, dirt and other such obstructions to the deposition of the covering of metal should be removed before such covering is applied.

The industrial applications of my invention are numerous and need not be pointed out in detail, but I will mention by the way of illustration the coating of gas and water pipes, cooking utensils, cast iron ornaments, railings and other objects exposed to the weather, and metallic surfaces which are to be painted or enameled.

I claim as my invention—

The herein described process of coating iron and steel articles with magnetic oxide, which consists in first covering such articles

with a layer of metal or alloy which volatilizes at a less temperature than would deform the articles, and then heating them to the temperature at which a coating of magnetic oxide will be formed thereon and the covering of metal or alloy will be volatilized.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

PIERRE HENRY BERTRAND.

Witnesses:
ROBT. M. HOOPER,
JEAN VICTOR BARBANCE.