

UNITED STATES PATENT OFFICE.

FREDERICK S. BARFF, OF KILBURN, ENGLAND.

IMPROVEMENT IN PROCESSES OF PROTECTING IRON SURFACES.

Specification forming part of Letters Patent No. **182,148**, dated September 12, 1876; application filed August 14, 1876.

To all whom it may concern:

Be it known that I, FREDERICK SETTLE BARFF, of Kilburn, in the county of Middlesex, England, professor of chemistry, have invented Improvements in the Protection of Iron Surfaces, and in Cleaning the Same, of which the following is a specification:

This invention relates, first, in effecting, or in the production of, a protective coating or film of oxide or of oxides of iron upon the surfaces of objects composed either of iron or steel, by submitting such objects, when at an elevated temperature, to the action of steam, or by submitting the same to the action of superheated steam; second, in effecting the removal or deoxidation of the oxide or oxides of iron or rust existing upon the surface of the iron or steel objects to be treated, by submitting the same, at an elevated temperature, to the action of hydrogen.

In carrying out the first part of my invention, I place the objects composed of iron or steel in a muffle or chamber, so constructed as that it may be in part or wholly closed, and so that the contents of the interior of such muffle or chamber may be raised by means of external heat to an elevated temperature; and when the objects or articles have acquired a temperature sufficiently elevated to cause the decomposition of steam or of aqueous vapor when brought into contact therewith, I inject the same, and I continue the action of the steam, or of the aqueous vapor, until the desired protective film or coating of oxide has been produced, or, instead of submitting the objects or articles composed either of iron or of steel to the action of heat in the manner hereinbefore mentioned, I place the same in a chamber capable of being wholly or partially closed, and I cause superheated steam to be admitted and to circulate therein, and I continue this operation until the desired protective film or coating of oxide has been produced.

In carrying out the second part of my invention, I cause the objects or articles, composed either of iron or steel, from which it is desired to remove or reduce any coating or film of oxide of iron or rust prior to their being submitted to the before-mentioned oxidizing process to a deoxidizing process; and for this purpose I place such objects or arti-

cles in a chamber or apparatus capable of being wholly or partially closed, and so constructed as that the contents may be made to attain an elevated temperature by the application of external heat; and when such articles or objects have attained the desired temperature, or such a temperature as will cause the reduction of the oxide of iron to be effected by means of hydrogen, I admit hydrogen gas obtained or resulting from the before-mentioned oxidizing process, or obtained from other sources, and I cause the same to come in contact with the articles or objects until the desired reduction of the oxide has been effected.

After the objects or articles have been submitted to the first part of my invention, I prefer to remove them when at an elevated temperature, and to immerse them in oil, in the case of objects or articles composed of iron or steel, whereby the protective coating or film will be rendered more tough and permanent, and in the case of objects or articles composed of steel the temper which they will have lost may be recovered, or any desired temper may be obtained, as is well understood in the arts.

I claim—

1. The process of protecting iron or steel surfaces from rust or corrosion by submitting the plates, articles, or objects composed of the same, to an elevated temperature, in conjunction with superheated steam or aqueous vapor, so that a coating or film of oxide of iron, or what is commonly known as black oxide of iron, may be formed thereon.
2. The process of reducing the oxide or oxides of iron or rust when existing upon the plates, articles, or objects prior to their being treated in the manner hereinbefore described, by submitting said plates, articles, or objects to the action of hydrogen gas, as set forth.

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

FREDERICK SETTLE BARFF.

Witnesses:

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