UNITED STATES PATENT OFFICE.

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RUST-PROOFING COMPOUND.

1,341,100. Specification of Letters Patent. Patented May 25, 1920.

No Drawing. Application filed November 18, 1918. Serial No. 262,986.

To all whom it may concern:

Be it known that I, WILLIAM H. ALLEN, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Rust-Proofing Compound, of which the following is a specification.

This invention relates to rust-proofing articles of iron and steel as generally set forth in my prior Patents, No. 1,167,966, dated January 11, 1916; No. 1,271,002, dated July 2, 1918; No. 1,206,075, dated November 28, 1916; No. 1,215,463, dated February 13, 1917; No. 1,219,526, dated March 20, 1917; and No. 1,248,053, dated November 27, 1917; and its object is to provide a compound of iron and phosphorus which, when properly diluted to form a rust-proofing bath, will have maximum activity.

It has been observed that when phosphoric acid is diluted to constitute a rust-proofing bath, some time elapses before articles of iron and steel placed therein are actively affected by the bath. I have determined that until the amounts of the iron in the acid ferrous and ferric phosphates in the bath have approached the proportions of three to one, the action of the bath is slow, but that the nearer this proportion is approached, the more active the bath becomes. I have also determined that the addition of these phosphates in these proportions after each operation of the bath, that is, after the completion of the treatment of each batch of articles of iron and steel, is most advantageous in the building up or strengthening of the bath, and that unbalancing of the bath is avoided, which unbalancing usually occurs when phosphoric acid alone or acid phosphates of unknown composition are added to the bath.

I prefer to dissolve one part of iron scale, produced in working iron and steel at high heat, which scale has approximately the composition of $6FeO, Fe_2O_3$, in the equivalent of fifteen parts of pure phosphoric acid, thirty parts of fifty per cent. acid being preferred. This seems to produce a point of saturation under working conditions. Each part of iron scale is composed by weight approximately of three fourths of ferrous oxid and one fourth of ferric oxid, or theoretically of 432 parts of ferrous oxid and 160 parts of ferric oxid, but iron scale is not of very definite composition.

This saturated solution of acid phosphates is diluted to the usual strength of the rust-proofing bath (when 10 c. c. of the bath are neutralized by 15 c. c. n/10 alkali) and the bath is then heated nearly to the boiling point. It is now in its most active condition and the surfaces of articles of iron and steel placed therein become changed to a rust-proof ferro-ferric phosphate of iron in less time than when any other combination or proportions are used.

In all processes employing phosphoric acid solutions for rust-proofing, bubbles of hydrogen gas rise from the articles being treated and when they stop rising, the bath no longer acts on the articles therein, which are thereupon removed. When the bath is heated as stated above, the ferric iron probably assumes a colloidal form and is in part precipitated, in which form it is peculiarly active.

Manganese dioxid may be used in this bath if desired as specified in the patent to Richards, No. 1,069,903, dated August 12, 1913.

I claim:—

1. The combination of substantially one part of ferric oxid, substantially three parts of ferrous oxid and substantially the equivalent of sixty parts of commercially pure phosphoric acid, substantially for the purpose set forth.

2. The combination of iron scale dissolved in phosphoric acid to a point of saturation of the ferric oxid in the scale, and this solution diluted with water substantially as set forth to form a bath for rust-proofing articles of iron and steel.

3. The material set forth in claim 1 diluted with water substantially as set forth to form a bath for rust-proofing articles of iron and steel.

4. The combination of one part of iron scale dissolved in substantially the equivalent of fifteen parts of commercially pure phosphoric acid.

WILLIAM H. ALLEN.