

UNITED STATES PATENT OFFICE.

WALTER I. OESCHGER, OF DETROIT, MICHIGAN, ASSIGNOR TO PARKER RUST PROOF COMPANY OF AMERICA, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

RUST-PROOFING IRON AND STEEL SURFACES.

1,254,263.

Specification of Letters Patent.

Patented Jan. 22, 1918.

No Drawing.

Application filed February 21, 1917. Serial No. 150,015.

To all whom it may concern:

Be it known that I, WALTER I. OESCHGER, 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 Process of Rust-Proofing Iron and Steel Surfaces, of which the following is a specification.

This invention relates to a process of forming non-corrodible protective surfaces on articles made from iron or steel, or alloys thereof, and to the production of the materials to be used in such process, and has for its object certain improvements in the method of treating said articles and in the compounds or materials used to produce permanent surfaces, which, while not injuriously affecting the ferrous masses, will retain their efficiency as a protective medium against the action of the elements of the atmosphere.

The articles of iron and steel to be treated are placed in a bath which is usually kept at about the boiling point, but the exact temperature and the proportioning of the constituent elements of the bath are determined by the metallurgical character of the articles to be treated. The preferred composition of the bath is about 98 per cent. of water and less than two per cent. of a metallic phosphate such as the acid meta-phosphates of tungsten, molybdenum or of any of the metals of the third, fourth and fifth groups, according to the analytical classification (set forth by Prof. G. S. Newth, F. I. C., F. C. S., in the eighth edition of his "Manual of Chemical Analysis", published by Longmans, Green & Co., New York, in 1909), taken either singly or in combination with each other.

In this classification, tungsten is in the first group, molybdenum in the second group, while the third, fourth and fifth groups include aluminum, chromium, cobalt, iron, nickel, manganese, zinc, barium, strontium, calcium, sodium, potassium, magnesium and vanadium.

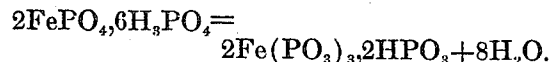
The acid meta-phosphate of most general application is made by placing a quantity of iron oxid, preferably black iron scale, (Fe_2O_3) in a pot with sufficient phosphoric acid to form a soft paste. The iron oxid is preferably powdered in advance. An

amount of water equal to the acid is added to keep the mass from caking, after which heat is applied and the material is stirred until a dry granular mass is obtained, which is then powdered. If desired, heat may be applied to the oxid and acid before water is added. To obtain the phosphates of the other metals, their oxids or carbonates may be similarly treated. Care must be taken to avoid heating these phosphates to a point where there is more than merely perceptible fuming.

The reactions may be expressed as follows:—When heated



And continued heating results in driving off the water of combination



This is an acid meta-phosphate.

The acid meta-phosphates thus produced are placed in water in the approximate proportions above set forth. It has been found that a percentage of phosphates as low as one-half of one per cent. will serve the purpose intended, but that the action will be slow. If more than two per cent. of phosphates are placed in the bath, the action is quite rapid and at times rather uneven. The preferred proportion of the acid meta-phosphates is about one and one-half per cent. The best action is secured when the bath is kept at about the boiling point.

It has been found that the mixing of about two per cent. of strontium acid meta-phosphate with the iron compound above described gives a much more uniform and harder surface when high carbon steels are treated. Practically the same good result is attained by using the same percentage of molybdenum or tungsten acid meta-phosphates instead of the strontium acid meta-phosphate in combination with the iron compound. There is little advantage in using any of these acid meta-phosphates alone or in any combination that does not include iron acid meta-phosphate as the cost is much higher and the addition of a large percentage of iron acid meta-phosphate seems to have no objectionable effect. Articles treated in this manner do not have

the "pickled" appearance sometimes observed when ferric-acid-phosphates are used for this purpose.

I claim:—

5 1. A new and useful process consisting of heating iron oxid with water and phosphoric acid and stirring while continuing the heat until a granular mass is obtained, placing this in an excess of water, heating
10 the bath and immersing articles of iron or steel until a protective coating is formed thereon.

2. A new and useful process consisting of placing acid meta-phosphates of tungsten,
15 molybdenum or any of the metals of the third, fourth and fifth groups in an excess of water, and immersing therein articles of iron or steel.

3. A new and useful process consisting of placing the acid meta-phosphates of tungsten, 20 molybdenum or any of the metals of the third, fourth and fifth groups in an excess of water, and immersing therein articles of iron and steel while the bath is kept at substantially the boiling point.

4. A new and useful process consisting in mixing iron oxid and phosphoric acid and heating them, adding water and stirring while the heat is continued, grinding the dry mass to powder, adding the powder to 30 fifty times its weight of water and two per cent. of its weight in meta-phosphate of another metal, then immersing articles of iron or steel to be treated.

WALTER I. OESCHGER.