

UNITED STATES PATENT OFFICE.

THOMAS WATTS COSLETT, OF BIRMINGHAM, ENGLAND.

TREATMENT OF IRON OR STEEL FOR PREVENTING OXIDATION OR RUSTING.

No. 870,937.

Specification of Letters Patent.

Patented Nov. 12, 1907.

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To all whom it may concern:

Be it known that THOMAS WATTS COSLETT, a subject of the King of Great Britain, residing at 17 Jamaica Row, Birmingham, in the county of Warwick, England, manufacturing chemist, has invented certain new and useful Improvements Relating to the Treatment of Iron or Steel for Preventing Oxidation or Rusting, of which the following is a specification.

This invention relates to improvements in the kind of treatment of iron or steel for preventing oxidation or "rusting" in which the iron or steel, or articles composed or having a surface of iron or steel is or are provided with a protective covering adapted to render the surfaces thereof capable of resisting, or of being unaffected by, the action of moisture and other oxidizing or "rusting" influences.

It has heretofore been proposed to treat iron with glacial phosphoric acid and also to treat iron wire with the said acid dissolved in water with the object of preventing rust; I would therefore have it understood that the treatment according to my invention differs from these previous proposals in that the iron or steel is subjected to the action of a dilute solution of ordinary phosphoric acid, whereby I effect a deposit thereon consisting of a mixture of normal ferric and ferrous phosphate of iron.

According to this invention, the iron or steel or the articles composed or having a surface of iron or steel is or are subjected to treatment which has the effect of furnishing the same with a covering or deposit of phosphate of iron; whereby it is found that the metals or articles are rendered immune from the deleterious influence of oxidation or rusting.

In carrying out the invention, the iron or steel or the article composed or having a surface of iron or steel is immersed in, or otherwise subjected to, the action of a compound consisting of a dilute solution of ordinary phosphoric acid, a suitable substance, such as iron filings ferrous phosphate or other appropriate compound, being also employed for the purpose of controlling or regulating the rapidity or strength of the chemical action upon the metal or articles undergoing treatment; the employment of a controlling or regulating material although preferable is not however indispensable, the essential feature of the invention being the protective covering or deposit of the aforesaid phosphate of iron which, in some instances, may be produced by subjecting the iron or steel surface or article to the action of a dilute solution of phosphoric acid alone or by passing an electric current through a dilute solution of ordinary phosphoric acid with (or without) the addition of an appropriate substance or compound adapted to control or regulate the chemical reactions.

A solution or composition which has been found to give satisfactory results, may contain the following ingredients or substances in or about the proportions given, viz:—

Iron in the form of filings or powder..... 1 ounce.
Phosphoric acid, concentrated..... 4 fluid ounces.
Water..... 160 fluid ounces.

For the purpose of my invention a quantity of the solution containing the above mentioned ingredients may be placed in an enameled iron bath or other vessel and heated to the boiling point, whereupon the metal or the article or articles to be treated, after being thoroughly cleaned, is or are immersed therein, and the solution or composition evaporated to any desired extent, as for example, to about one seventh of its original volume. The articles thus treated may then be withdrawn, and, after being thoroughly wiped and dried, may be oiled preparatory to use.

The coating or deposit, produced upon the surface of the article, by the process above described, which consists of phosphate of iron, may be strengthened or thickened if necessary by repeating the process, or by adding a further quantity of phosphoric acid and iron filings or powder to the solution after partial evaporation, and then diluting and reëvaporating.

Should the coating or deposit be undesirably thick, the excess may readily be removed by subjecting the coated article, upon withdrawal from the bath, to treatment by cold water. If it be desired to vary the tone or color of the coating or deposit, the metals after completion of the aforesaid process may be immersed in a cold or boiling solution containing substances such as sulfids, tannic acid or such substances may be used in the original bath together with the other ingredients before mentioned. Discretion should, however, be exercised in the selection and employment thereof so as not to impair the efficiency of the coating or deposit of phosphate of iron.

Various mechanical contrivances may be employed for carrying out the process of immersion or treatment. For instance, the articles may be inclosed by a screen or cage whereof the walls are perforated or constructed of wire, muslin or other cotton or woolen fabric of such a mesh as will prevent the passage of fine particles, such as the iron filings, when used, while permitting of the free passage of the solution.

The above mentioned screen or cage may be used in conjunction with a cage or drum adapted to be rotated so as to effectually bring the surfaces to be treated under the action of the solution, but more particularly to prevent irregular deposits. If rotary motion may be employed the first mentioned inclosing cage or screen may in some cases be dispensed with.

What I claim and desire to secure by Letters Patent of the United States is:—

1. The treatment of iron or steel or articles composed or having a surface of iron or steel, consisting in subjecting
5 the same to the action of a dilute solution of ordinary phosphoric acid whereby a deposit is effected thereon of phosphate of iron for the purposes specified.
2. In the treatment of iron or steel or articles composed or having a surface of iron or steel, a compound consisting
10 of a dilute solution of ordinary phosphoric acid substantially as and for the purposes specified.
3. In the treatment of iron or steel or articles composed or having a surface of iron or steel, a compound consisting
15 of a dilute solution of ordinary phosphoric acid with the addition of a substance adapted to control or regulate the chemical reactions, substantially as and for the purposes specified.
4. In the treatment of iron or steel or articles composed or having a surface of iron or steel, the solution or com-
20 position consisting of ordinary phosphoric acid, iron and water, in or about the proportions hereinbefore stated.
5. A protective covering for iron or steel or articles composed or having a surface of iron or steel comprising,

as an essential constituent, normal ferric and ferrous phosphate of iron, for the purposes specified. 25

6. Iron or steel or articles composed or having a surface of iron or steel furnished with a coating or deposit of phosphate of iron, substantially as hereinbefore described for the purposes specified.

7. In the treatment of iron or steel or articles composed or having a surface of iron or steel, effecting a coating or deposit thereon of phosphate of iron by passing an electric current through a dilute solution of ordinary phosphoric acid. 30

8. In the treatment of iron or steel or articles composed or having a surface of iron or steel, effecting a coating or deposit thereon of phosphate of iron by passing an electric current through a dilute solution of ordinary phosphoric acid with the addition of a substance adapted to control or regulate the chemical reactions. 35

In testimony whereof I affix my signature in presence of two witnesses. 40

THOMAS WATTS COSLETT.

Witnesses:

ERNEST HARKER,
E. M. WEBB.