UNITED STATES PATENT OFFICE.

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METHOD OF PREPARING PICKLED IRON AND STEEL FOR PAINTING.

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To all whom it may concern:

Be it known that I, JAMES H. GRAVELL, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented a certain new and useful Method of Preparing Pickled Iron and Steel for Painting, of which the following is a specification.

It is now well known that iron and steel must be cleaned before they are painted in order that the applied paint may be permanent. Unless the metal is properly prepared, rust forms under the paint and destroys the protective coating of paint, allowing the atmosphere to have free access to the metal thereby further rusting it.

One of the methods used for preparing metals for painting is known as pickling, and consists in subjecting the metal to the action of a sulfuric acid bath or a bath containing hydrochloric acid. These pickling baths remove the scale and rust and attack the surface of the metal, thereby ridding it of objectionable materials, and seemingly produce a clean surface on which to apply the paint, but it is well known that a pickled surface, after having been painted, will not remain free from rust. This is due to small amounts of pickle remaining on the surface even though the metal has been washed. That is, although washing removes a large percentage of the pickle, yet sufficient remains behind to give trouble. In order to neutralize the small percentage of pickle remaining on the metal it is practical to treat the metal with lime-water which, on drying, leaves the surface thinly coated with a powder consisting mostly of a mixture of calcium hydroxid with a small percentage of calcium sulfate. Although this helps matters to a great extent, yet it is not a positive cure, as the lime remaining behind both in the form of the sulfate and the hydroxid has a deleterious action on the paint.

I have discovered that the rusting properties of pickling baths may be entirely destroyed by subsequently treating the metal with a bath of phosphoric acid, thus avoiding the use of the lime-water bath and at the same time preventing the metal from rusting.

Based on my discovery I have invented a process by which pickled iron and steel can be cheaply prepared for painting so that there is no danger of the metal rusting under the paint and in fact no danger of the metal rusting while it is being fabricated or stored prior to painting.

My method consists in first pickling the metal by the regular pickling process with pickling acids:—sulfuric acid or hydrochloric acid:—and then giving the metal a second pickle in a solution of phosphoric acid which removes the surface metal which has been in actual contact with the pickling agents in the first operation. After these two pickling operations the metal is allowed to dry. If the painting operation is included in the treatment, the treatment can be considered a rust-proofing process as the surface of the metal remains free from rust even after the paint appears to have been entirely removed by the weather.

One of the ways of carrying out my process, commercially, consists in immersing the metal in a bath of sulfuric acid heated nearly to a boiling temperature until the metal has been sufficiently cleaned; the metal is then removed from this bath and immersed in a bath of water to remove most of the sulfuric acid. The bath of water need not be heated but it should be constantly renewed. After removing the metal from the water bath, the metal is immersed in a bath of phosphoric acid or a salt of phosphoric acid which will produce the same result. The phosphoric acid bath may be cold and its strength can be altered to a great extent, depending on the future manipulations through which the metal is passed. I have found that one part by volume of 85% phosphoric acid and ten parts by volume of water produces satisfactory results. After removing the work from the phosphoric acid bath it is allowed to drain and dry.

Metal treated according to my method may be painted without danger of the metal rusting under the paint, and owing to the fact that no rust accumulates under the paint, the painted finish will be permanent.

Although I have described my process in detail in connection with hot sulfuric acid pickle, it is evident that I may substitute hydrochloric acid or may use a cold pickle without departing from my invention.

In cases where it is inconvenient to wash the metal prior to immersing it in the phosphoric acid solution, I have found that the addition of a small amount of calcium phos-

phate to the phosphoric acid bath neutralizes the acid which may be carried from the pickle.

I claim:

1. The method of preparing pickled iron and steel for painting which consists in subjecting the pickled metal to the solvent action of phosphoric acid, substantially as described.

2. The method of preparing pickled iron and steel for painting which consists in washing the pickled metal, and then subjecting the washed metal to the solvent action of phosphoric acid, substantially as described.

3. The method of preparing iron and steel which consists in pickling the iron or steel, subjecting the pickled iron or steel to the solvent action of phosphoric acid, and then painting the iron or steel, substantially as described.

4. The method of preparing metals for painting which consists in first pickling the metal with sulfuric acid to remove rust and scale, and then removing the surface metal which has contacted with the pickle by the action of a solution of phosphoric acid, substantially as described.

5. The method of preparing iron and steel to oppose rusting consequent upon pickling which consists in first pickling the metal with sulfuric acid, and then removing the surface metal which has contacted with the pickle by a solution of phosphoric acid containing calcium phosphate.

JAMES H. GRAVELL.