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PROCESS OF COATING METALS WITH METAL PHOSPHIDES.

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To all whom it may concern:

Be it known that I, SAMUEL PEACOCK, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented certain new and useful Improvements in Processes of Coating Metals with Metal Phosphides; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a process of coating metal shapes in general with protective films, consisting of phosphides and oxyphosphides of the metal to be coated, and has for its object to improve the procedures and to lessen the cost of the processes heretofore proposed.

With these and other objects in view, the invention consists in the novel steps and combinations of steps constituting the process, all as will be more fully hereinafter disclosed and particularly pointed out in the claims.

In carrying out this invention, I finely divide phosphate rock so that it will pass say a hundred mesh screen, and I add finely divided carbon thereto, such as charcoal, or other carbon, which is substantially free from sulphur. To the mixture thus produced, I next add a sufficient quantity of a heavy oil to make a paint of a consistency that is easily applied to the metal to be coated. Instead of phosphate rock, I may employ any metal phosphate, such, for example, as sodium phosphate in making up the paint mixture, and the said paint mixture may be conveniently applied to the metal forms to be coated by any suitable means, such as a brush or by a dipping process.

If iron or steel forms are to be coated, it is not necessary to remove the ferro-ferric oxide coating that is usually present on these forms, because the reaction which takes place destroys this said black oxide coating, as will presently appear.

After the said metal forms, for example, those of iron or steel, are thus painted or otherwise coated with the above mixture, their surfaces are heated by any suitable means in a non-oxidizing atmosphere to a temperature of about 1600° F., whereupon the tri-calcium phosphate is decomposed with the formation of metal phosphides, and oxyphosphides on the surface of the metal being coated. The carbon present reduces the ferro-ferric oxide coating on the iron and steel forms being treated, and thus leaves a clean iron or steel surface with which the phosphides and oxyphosphides immediately react to form on the surfaces of said iron or steel objects protecting coatings of iron phosphides, and iron oxyphosphides. These coatings take a high polish, they are black in appearance, are pleasant to the eye, and are very efficient in protecting the metal against oxidation and corrosion of the iron and steel in general.

This process is found to be desirable for coating sheets of iron or steel with iron phosphide protecting films, and when so coated said sheets are found useful for shingles, automobile bodies, and for the manufacture of a large number of other useful articles. In applying the process to sheets of this character, the said sheets, after the dipping or painting process, are piled up in stacks in suitable annealing boxes, when the process of annealing also effects the formation of the iron phosphide coatings, thus rendering the entire process very much less costly than the prior procedures. When copper objects are coated in the manner above disclosed, they are likewise provided with protective coatings of copper phosphides, and copper oxyphosphides, and when thus coated are found to be protected against corrosion in general except possibly when brought into contact with strong mineral acids.

It is obvious that those skilled in the art may vary the details of the procedure without departing from the spirit of the invention, and therefore I do not wish to be limited to the above disclosure except as may be required by the claims.

What is claimed is:

1. The process of coating metal shapes with protecting films which consists in making a mixture containing a phosphate compound and carbon mixed with a viscous vehicle to form a paint; applying said paint to the metal surfaces to be protected; and heating said surfaces to a temperature sufficient to form a film containing a phosphide of the coated metal, substantially as described.

2. The process of coating metal shapes with protecting metal phosphide films which consists in mixing a phosphate of a metal or an alkaline earth with carbon; applying said mixture to the surface of the metal to be coated; and heating said surface to a temperature sufficient to coat said surface with a film containing a phosphide of the coated metal, substantially as described.

3. The process of coating metal shapes of iron and steel with protecting metal phosphide films which consists in mixing a phosphate of a metal or an alkaline earth metal with carbon; applying said mixture to the surface of the metal to be coated; and heating said surface to a temperature of substantially 1600° F. and for a time sufficient to coat said surface with a film containing a phosphide of the coated metal, substantially as described.

4. The process of coating iron and steel surfaces with a phosphide of iron which consists in coating said surfaces with a paint like mixture containing carbon and phosphorus in a phosphate combination; and raising the temperature of said surface and coating to a point sufficient to coat said surface with an iron phosphide, substantially as described.

5. The process of coating iron and steel surfaces with a phosphide of iron which consists in coating said surfaces with a paint like mixture containing carbon substantially free from sulphur and phosphorus in a phosphate combination; and raising the temperature of said surface and coating in a non-oxidizing atmosphere to a point sufficient to coat said surface with an iron phosphide, substantially as described.

In testimony whereof I affix my signature.

SAMUEL PEACOCK.