

UNITED STATES PATENT OFFICE

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PROCESS OF TREATING METALS

No Drawing.

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This invention relates to the art of treating metals so as to protect them against the effects of oxidation and other corrosive agencies.

5 More specifically, my invention relates to the production of an unoxidizable coating on such metals as iron, steel, and copper which readily oxidize at elevated temperatures, and has for its primary object the production of an improved process of the type set forth in the patent to Goodwin H. Howe, No. 1,655,269, dated January 3, 1928. This patent deals with the process of applying a coating-metal as a paint. The advantages resulting from such a process are numerous and are set forth in this patent. The method consists essentially of covering the surface of the foundation metal with a mixture of another metal in powdered form and a nitrocellulose binder at ordinary temperatures, and then firing at a temperature which will cause the powdered metal to alloy with the foundation metal. The essential idea underlying this process is the use of a binder for the aluminum or other coating metal which will volatilize or decompose at a temperature below the temperature at which the aluminum alloys and leave no residue to interfere with such alloying action.

30 While a binder of nitrocellulose as specified in the Howe patent is satisfactory in most cases, yet, due to the nature of the material, it volatilizes with little explosions in the neighborhood of 130° C. Such action on the part of the binder has the disadvantage that the aluminum powder, or other coating metal, may be blown or loosened from the surface of the material being coated with the result that the coating may not be as adherent as it otherwise might be. Another drawback in the use of nitrocellulose binders is found in the nature of the material itself. Such binders have a fire hazard which must be guarded against.

45 In accordance with my invention a process of providing protective coatings may be carried out with a binder which will evaporate quickly at not too low a temperature leaving no residue whatsoever to interfere with the coating process and which has no explosive

or fire hazard. I have discovered that such a binder may be found in resins of the alkyd type. As is known, resins of the alkyd type include all those complexes resulting primarily from the interaction of a polyhydric alcohol and a polybasic acid with or without other reacting ingredients. The most familiar example of a resin of this type is that obtained by the reaction of glycerine and phthalic anhydride. A resin of this type in the form of a thin film, when heated in the air to about 380° C., evaporates quickly without leaving any carbonaceous residue. The glycerine disappears as carbon dioxide and water; the phthalic anhydride probably as such. Such a resin does not explode or conflagrate as does nitrocellulose, and unlike most of the organic binders, does not leave a tarry residue which prevents the aluminum from coming into chemical contact with the foundation metal to be coated. Actual work with paints containing aluminum powder suspended in alkyd resins as the binding metal shows that calorizing with such a mixture is superior to the methods at present used.

In carrying my invention into effect I may use a paint comprising aluminum powder, or any other coating metal in the powdered or granular form, and any volatilizable alkyd resin as the binder. The resin may be dissolved in a suitable solvent to produce a solution of the desired viscosity. The desired coating metal is suspended in this medium. While any alkyd resin may be employed as the binder, I prefer to use a resin obtained by the interreaction of equal molecular proportions of glycerine and phthalic anhydride as such a resin when used as the binding medium has given very satisfactory results. The preparation of such a resin is well known in the art.

The process of calorizing which I employ is that set forth in the above-mentioned Howe patent. All the advantages mentioned in this patent may be obtained by the use of my process without any of the attendant disadvantages of nitrocellulose binders as set forth above and a markedly superior process and product result.

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

1. The process of protecting metallic articles from oxidation or corrosion which consists in covering the surface of the article with a mixture of another metal in powdered form and a substantially volatilizable alkyd resin binder, and then firing at a temperature which will cause the powdered metal to alloy with the metal of the article.

2. The process of protecting metallic articles from oxidation or corrosion which consists in covering the surface to be protected with a powdered metal adapted to form an oxidation or corrosion resisting alloy with the metal on the article, said powdered covering metal being applied at ordinary temperatures in combination with a substantially volatilizable alkyd resin binder, and then firing at a temperature which will cause the covering metal to alloy with the metal of the article.

3. The process of protecting metallic articles from oxidation and corrosion which consists in covering at ordinary temperatures the surface of the article with a mixture of aluminum powder and a liquid consisting of a substantially volatilizable alkyd resin and a volatile solvent, and then firing at a temperature which will cause the aluminum to alloy with the metal of the article.

4. The process of protecting metallic articles from oxidation or corrosion which consists in covering the article with a coating composed of aluminum powder and a binder having a substantially volatilizable alkyd resin base, drying the coating, and then firing it at a temperature which will cause the aluminum to alloy with the metal of the article.

5. The process of protecting metallic articles from oxidation or corrosion which consists in covering the articles at ordinary temperatures with a coating composed of aluminum powder and a liquid alkyd resin binder which wets and firmly adheres to metals at ordinary temperatures and volatilizes at higher temperatures, drying the coating, and then firing at a temperature at which the aluminum alloys with the metal of the article, said temperature being above that at which the binder volatilizes.

6. The process of protecting a foundation metal from oxidation or corrosion which consists in covering the surface of the foundation metal with a mixture of aluminum powder and a liquid consisting of a glycerine-phthalate resin and a volatile solvent, and then firing at a temperature which will cause the aluminum to alloy with the foundation metal.

In witness whereof, I have hereunto set my hand this 15th day of November, 1929.