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METAL TREATING PROCESS

John S. Thompson, Detroit, and Harold F. Bristol, Highland Park, Mich., assignors to The Patents Corporation, Detroit, Mich.

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6 Claims. (Cl. 91—68)

This invention relates to the field of treating metal surfaces so as to increase their corrosion resistance and to improve the paint holding qualities thereof.

Heretofore, many processes have been set forth for this purpose, but in many instances these processes have been inadequate because of the cumbersome equipment necessary or high cost of materials.

The present invention is suited for use in situations where only a small area is available for such an operation. It requires no cumbersome equipment to carry it into operation and yet is very effective.

The invention is carried out by applying to the surface of the metal to be treated an insoluble chromate in finely divided form mixed with water, preferably to a mud-like consistency. It is applied in any convenient manner, but it is suggested that it be rubbed on and into the surface of the metal either by hand or by means of a mechanical rubbing machine. Only a thin coating of the chromate paste is necessary if it is rubbed thoroughly into the surface pores of the metal, and in such a manner that the entire surface is covered. After this operation the coating is allowed to dry thoroughly either by ordinary action of the air or by heat and then the excess powdery chromate is wiped off with a cloth.

The surface of the metal after treatment has a dusty appearance of the color of the chromate used. However, it is found that when coated with a siccative coating the final finish has much greater adhesion to the metal surface and the surface itself is more corrosion resistant.

The invention may be applied to any of the metals which are oxidized by atmospheric and weathering conditions as chromate has a peculiar effect of increasing their corrosion resistance.

Any of the insoluble chromates which are available commercially may be used, but preferably one or mixtures of the following: Ferric chromate, zinc chromate, cobalt chromate, barium chromate and copper chromate.

It has also been discovered that where opportunity permits, a treatment of the metal surface in an acid pickling solution prior to the treatment with the insoluble chromate produces even more beneficial results. For this pickling solution any of the acids which will etch the particular metal being used are suitable for this purpose, the only essential being that the surface is etched.

To illustrate the invention the following example is given: A steel article is treated for one minute in a 1% solution of sulphuric acid at boiling temperature, rinsed in a clear water rinse, and then ferric chromate in finely divided form thoroughly mixed with water to a paste-like consistency is rubbed thoroughly on and into the surface by hand using a cloth saturated with the paste. When the entire surface is covered with a thin film of the paste, the surface is allowed to air dry and then the excess chromate is brushed or wiped off. The article is then ready for the application of a paint system.

A zinc article may be treated exactly in the same manner as above disclosed.

The chromate may be applied in other ways. For example, the paste may be spread onto and rubbed into the metal surface with a brush; or the chromate mix may be applied by means of a compressed air spray gun. Also, where space and convenience permits, a successful application is possible by immersing the metal in a more diluted mix as well as spraying the diluted mix onto the surface in a mechanical spraying machine.

A further variation is provided by mixing the chromate in a solution of chromic acid instead of plain water. For this purpose the strength of the chromic acid solution to be used may vary within wide limits, but satisfactory results are obtained between 5 and 10 grams CrO_3 per gallon of water. These mixes may be applied by any of the methods described above.

As a still further variation, the dry chromate powder may be dusted, brushed or rubbed on the metal surfaces as such, the excess to be taken off before applying a final finish.

The exact action of the chromate with the metal surface is not thoroughly understood, but it has been discovered that the presence of an insoluble chromate as applied by this invention has a very beneficial effect upon the corrosion resistance of the paint holding qualities of metal surfaces generally.

The invention has been found to be applicable and very beneficial when used prior to finishing with paints, enamels and lacquers.

It was known in the prior art to use a basic zinc chromate in paints, together with fillers, paint vehicles such as linseed oil, etc. The present invention, of course, differs from the prior art in that the metallic surface is first treated with a zinc chromate and after this treatment a finish coat of paint, enamel or lacquer is applied. The treatment of the present invention gives a decidedly superior rust resistance to the metallic surface and the pre-treatment with the insoluble chromate provides a paint-holding coating. It was also known in the art to coat gun barrels

with a composition of petrolatum in which was incorporated a small amount of zinc chromate. However, no finish coat was applied over the petrolatum and there was no intention of obtaining a paint-holding coating to be rust-resistant under the finish coat.

While various insoluble chromates have been mentioned as being suitable for the purposes of this invention we have discovered that highly superior results are obtained by using ferric chromate and this is the preferred form of the invention.

It is understood that the above detailed description is given with the intention of illustrating the invention, the scope of which is to be determined only by the appended claims.

In applying the compositions of this invention it has been found that water-soluble wetting agents are of some help in getting uniform wetting of the metallic surface being treated. Various alcohols may be used for this purpose. Where chromic acid is used in the compositions, wetting agents must be employed, of course, which are compatible with chromic acid. In some cases, sulfonated alcohols such as "Gardinol" (trade name) may be used. Tertiary butyl alcohol is the preferred wetting agent to be used in the presence of chromic acid.

What we claim is:

1. A method of treating a surface of one of the group consisting of iron, steel and zinc which comprises applying thereto an insoluble chromate in finely divided form, drying if necessary, removing the excess chromate and thereafter applying a coat of one of the group consisting of paints, enamels and lacquers.

2. A method of treating a surface of one of the group consisting of iron, steel and zinc which comprises applying thereto an insoluble chromate in water suspension, drying, removing excess chromate and then applying a coat of one of the group consisting of paints, enamels and lacquers.

3. A method of treating a surface of one of the group consisting of iron, steel and zinc which comprises applying thereto a suspension of an insoluble chromate in chromic acid, drying, removing excess chromate and thereafter applying a coat of one of the group consisting of paints, lacquers and enamels.

4. A method of treating a surface of one of the group consisting of iron, steel and zinc so as to increase their corrosion resistance and adherence to finish films which comprises applying thereto an aqueous suspension of one of the group consisting of chromates of ferric iron, zinc, cobalt, barium and copper, and mixtures, drying, removing excess chromate and thereafter applying a finish coat of one of the group consisting of paints, lacquers and enamels.

5. A method of treating a surface of one of the group consisting of iron, steel and zinc so as to increase their corrosion resistance and adherence to finish films which comprises applying thereto a suspension of one of the group consisting of chromates of ferric iron, zinc, cobalt, barium and copper and mixtures in chromic acid, drying, removing excess chromate and thereafter applying a finish coat of one of the group consisting of paints, lacquers and enamels.

6. A method of treating surfaces of iron, steel or zinc so as to increase their corrosion resistance and adhesion to finish films which comprises pickling the surface and applying thereto an insoluble chromate in finely divided form, drying if necessary, removing excess chromate and thereafter applying a finish coat of one of the group consisting of paints, lacquers and enamels.

JOHN S. THOMPSON.
HAROLD F. BRISTOL.