

UNITED STATES PATENT OFFICE

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METHOD OF RENDERING METALS OR ALLOYS NONCORRODIBLE

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This invention relates to a method of, or process for, rendering certain metals or alloys more non-corrodible and is particularly applicable to the manufacture of plant and apparatus for use in chemical work and work of an allied nature and also for other plant and apparatus where a surface is required which shall be resistant to corrosive action. Further, the invention refers, preferably, though not necessarily, to austenitic nickel-chromium acid-resisting steels.

It is known that the corrosion resistance of metals is largely due to the nature of the surface, for example, in certain metals a very highly polished surface is known to give greater corrosion resisting properties to the metal than a surface not highly polished, and it is considered that such increased corrosion resistance is due to the procedure adopted in preparing the surface resulting in the formation of a protective or passive surface.

It has, however, also been found by me that under certain tests, the variability in the corrosion resistance which occurs in the surface of metals of identical compositions is due to variations or lack of uniformity in such passive surface.

The object of this invention, therefore, is to provide an improved method by which a consistently passive surface may be produced.

According to this invention, therefore, the metal or a metal article or body, after having been polished and ground or otherwise dealt with so as to produce the desired prepared surface, is subjected to heat-treatment but at such a temperature that oxidation effects are not apparent, for instance at temperatures ranging from 100° to 400° C. The length of duration of the heat-treatment may vary according to the nature of the body or article being treated or to the temperature. For example, the higher the temperature, the shorter may be the duration of treatment. After this heat-treatment, the article is cooled as may be convenient either quickly or slowly.

According to this invention, a passive or corrosion-resisting surface can be produced which will give a very high and uniform resistance to the corrosive action of various corroding media.

Austenitic nickel-chromium steel containing 10% to 25% of chromium and 25% to 5% of nickel with or without the presence of molybdenum, tungsten, copper or other elements which are added to such steels for different purposes, may so be effectively treated, such elements being added in small proportions, as hitherto used in the art. As an instance a steel containing—

	Per cent
Carbon	0.14
Nickel	8.0
Chromium	18.0

after treatment at 200° C., gave uniform resistance to citric acid.

It is assumed that prior to the grinding and polishing operations referred to, which in the absence of the employment of the final low temperature treatment herein described would constitute the usual finishing operations on the bodies or vessels, the articles have received the normal mechanical or heat treatment necessary for the production of the desired mechanical properties and structural condition; that is to say, the special final low temperature treatment herein described is applied with the sole object of modifying the surface condition of the bodies, and not with the object of modifying the structural condition or mechanical properties.

What I claim and desire to secure by Letters Patent is:—

1. The process of preparing a non-corrodible metal body, of austenitic nickel-chromium steel, containing 10 per cent to 25 per cent of chromium and 25 per cent to 5 per cent of nickel, the balance being substantially iron, consisting in grinding and polishing a metal body having been subjected to the normal manipulation and heat treatment, and giving it a final low temperature heat treatment at such a temperature that oxidation effects are not apparent, for instance, at a temperature ranging from 100 degrees C. to 400 degrees C., with subsequent cooling, as the result of which treatment the metal is rendered uniformly resistant to corrosion.

2. A metal body of austenitic nickel-chromium steel containing 10 per cent. to 25 per cent, of chromium and 25 per cent. to 5 per cent. of nickel, the balance being substantially iron, the surface of which is given a smooth polished appearance by any known process of polishing and grinding, after the said metal body has been subjected to the normal manipulation and heat treatment, and is then given a final low temperature heat treatment at such a temperature that oxidation effects are not apparent, for instance, at a temperature ranging from 100 degrees C. to 400 degrees C., with subsequent cooling, as the result of which treatment the metal is rendered uniformly resistant to corrosion.

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